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[OFFICIAL NOTICE.]

Third Annual Convention, Canadian Gas Association.

CANADIAN GAS ASSOCIATION,
OFFICE OF THE TREASURER,
WOODSTOCK, CANADA, April 19, 1910.

The Third Annual Convention of the Canadian Gas Association, and the first gas show ever held in Canada, will be held in Alexandria Rink, Hamilton, Ont., June 6th to 11th, inclusive. The Canadian Gas Association indorses to the fullest measure the exhibition.

Yours truly, A. W. MOORE, Secretary.

[OFFICIAL NOTICE.]

Southwestern Electrical and Gas Association.

SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION,
OFFICE OF SECRETARY,
DALLAS, TEX., Feb. 28, 1910.

The 6th annual convention of the Southwestern Electrical and Gas Association will be held in Beaumont, Tex., on May 12, 13 and 14, 1910. A feature of this meeting will be an exhibition of gas and electrical appliances and devices of all sorts. Elegant and roomy quarters for the display have been arranged for in the storeroom of the Kyle theater building. The matter is in charge of Messrs. M. T. Walker, Wm. Carroll, E. M. Weiss and J. C. Moss, Jr. The address of Mr. Wells, who is in charge of the renting of space, is Beaumont, Tex.

D. G. FISHER, Asst. Secretary.

[OFFICIAL NOTICE.]

Ninth Annual Meeting, Wisconsin Gas Association.

WISCONSIN GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
MILWAUKEE, WIS., April 20, 1910.

To the Members of the Wisconsin Gas Association: Owing to the removal from the State, of Mr. H. H. Hyde, former Secretary and Treasurer of the Wisconsin Gas Association, the writer has been temporarily charged with the duties of this office.

The ninth annual meeting of the Association will be held in Milwaukee, May 11th and 12th, at which time Mr. Hyde's permanent successor will be choosen. Headquarters will be at the Hotel Pfister, and the meeting will be called to order at 9 A.M., of the 11th, by the President, Mr. R. B. Brown. Arrangements for the meeting are now in a fair state of completion, and the committee in charge feels that it can safely promise a profitable and enjoyable visit to all who will participate. Among the subjects that will come up for discussion are the following papers:

"Conversion of a Low Pressure Distribution System to a Medium High Pressure System at Beloit," by Mr. E. D. J. Dickey, Beloit.

"Water Heaters," by Mr. J. H. Walker, Milwaukee.

"Calorimetry," by Mr. J. B. Klumpp, Philadelphia.

"Prepayment Meters," by Mr. C. Luebkeman, Eau Claire.

"Advantages of Screening Coke," by Mr. Guy F. Gregg, Milwaukee.

By way of entertainment of its members, the Association offers an informal beefsteak dinner, at the gymnasium of the Milwaukee Athletic Club, the distinctive features of which no doubt will appeal to all.

The gas men of Wisconsin have had more than their share of the hard and steady grind of business during the past year, due in a measure to the extra work caused by valuations and investigations through the Public Utilities Commission, wherefore, the members of the Wisconsin Gas Association owe it to themselves, as well as to the Association, to avail themselves of this splendid opportunity for relaxation, at the same time insuring a successful meeting.

Very truly yours, HENRY HARMAN, Acting Secretary.

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[Official Notice.]

Fifth Annual Meeting, Natural Gas Association.

Natural Gas Association of America,
Office of the Secretary,
Delaware, O., April 19, 1910.

The Fifth Annual Meeting of the Natural Gas Association of America will be held in Oklahoma City, Okla., May 17, 18 and 19, under the direction of Mr. Wm. Hunter McKenzie. The Lee-Huckins Hotel has been selected as headquarters and every indication is for a successful meeting. The programme will be given later.

Yours truly, Thomas Clive Jones, Secretary.

BRIEFLY TOLD.

The April Meeting, New York Section, Illuminating Engineering Society.—The custom of having two papers at the monthly meetings of the New York Section of the Illuminating Engineering Society was continued at the one held last month in the United Engineering Society's Building. The Section Chairman (Mr. E. L. Elliott) presided, and first called upon Mr. Bassett Jones, Jr., who read his paper on "Finite Surface Light Sources." This proved to be an amplification of a previous paper on the same topic, giving further data on the subject of illumination calculations from sources of large area. The second paper, on "The Relation of Fixture Designs to Modern Illuminating Engineering Practice," by Messrs. L. R. Hopton and H. E. Watkins, was read by the former. The modifications entering into the design of "period" fixtures, due to the improved illuminants and the higher intensities demanded, were clearly shown in an extremely terse and interesting manner. The discussion of these papers, while highly flattering to the authors, did not add much of interest to either of the subjects. There seems to be a small, but eloquent, number of members connected with this Section who lean toward the aesthetic rather than the engineering side in illumination, and they "had their innings" unmolested at this meeting. An interesting point was brought out by Mr. Bassett Jones, who stated that, in several monumental buildings, the architects had literally planned their rooms around the lighting. The papers were also discussed by Messrs. Marshall, Elliott, McGuire, Wohlauer and Spencer. At the May meeting Messrs. Sharp and Miller will present a paper on "Photometric Measurements," and Mr. C. O. Bond will speak on the subject of "Standards of Light." At the meeting for next month the local Section officers are to be elected for the ensuing year.

CURRENT MENTION—

We are informed that the Ramsdell Inverted Gas Lamp Company has recently closed a contract with the Municipal Lighting Company, New York city, which included the sale to that Company of Ramsdell inverted lamps and other Ramsdell lighting specialties, amounting to $8,000, which gives the Municipal Lighting Company a complete line of goods manufactured by the former well-known concern. The shipments will be completed to-day, when the New York office of the Ramsdell Inverted Gas Lamp Company will be in its factory, Waterbury, Conn., from which point its future business will be transacted under the personal supervision of Mr. George G. Ramsdell, President of the Company.

The Queens Borough Gas and Electric Company, which supplies gas, and acceptably, to the well-apart settlements that go to make up its working territory in Far Rockaway, Long Island, and which is exempted from the operations of the 80-cent gas rate in New York city proper, is having a hard time with a concern known as the "Progress Society." This body of progressiveists exists mainly with a view to turning things upside down, and is almost malevolently active in its attempts to get something for nothing, or as near to nothing as possible. They appealed to the Public Service Commission "for relief;" in fact, the "relief" consisted in their asking for a rate offhand for gas that would equal that ruling in the New York and Brooklyn districts of the city. Meanwhile the Company proposed to the progressors a schedule that would, we believe, in 4 years, bring the selling rate to $1 per 1,000—we believe the net rate there at present is $1.25 per 1,000. This sensible scheme had too much of fairness on its face to suit the "prog.'s," and they, having rejected all equitable offers for a rate arrangement, held a meeting on the 23d April, at which it was determined to "vigorously prosecute" the Company before the Public Service Commission for the First District. Having "vigorously persecuted" the Company, the "prog's." now propose to "vigorously prosecute" it. A new petition was gotten up, in consonance with the prosecution idea, which proposes that the Commission shall give a public hearing on the question on the 4th inst. The chairman of the "prog.'s" is Charles A. Brodek, a name that suggests those whose mission on earth is to "move on."

At the Jefferson City convention last April, of the Electric, Gas, Street Railway and Water Works Association, of Missouri, three interesting meeting days were fully occupied in discussing differing phases of the many interests which the Association represents. The business sessions were suitably spaced with sensible and enjoyable recreation times. The officers elected for the ensuing year were: President, R. J. Marshall, Irvine, Mo.; First Vice-President, F. E. Murray, Louisiana, Mo.; Second Vice-President, P. A. Bertrand, Jefferson City, Mo.; Third Vice-President, J. E. Harsh, Joplin, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo. The meeting next year will be held in Moberly, Mo.

The following resolutions were adopted by the Board of Directors of the Omaha (Neb.) Gas Company, following their action granting to Mr. Isaac Battin, Engineer and Treasurer of the Company, an indefinite leave of absence:

Whereas, Mr. Isaac Battin has been identified with the gas works of Omaha since June 11, 1887, and to his energy and integrity the growth of the business is largely due, and in appreciation of his services, be it

Resolved, That in the retirement of Mr. Battin from active service the Company loses a loyal and faithful officer; and be it further

Resolved, That we tender to Mr. Battin our best wishes for a long life, filled with the knowledge of duty well done; and that a copy of these resolutions be sent to Mr. Battin, and that a copy be spread upon the records of the Company.

Mr. Stephen Smith has resigned the position of contract agent to and for the Woonsocket (R. I.) Gas Company, in order to accept the management of the H. M. Wallace gas plant, at Iron Mountain, Mich.

"L. V. F.," writing from Cincinnati, under date of the 25th ult., says: "I failed to note any mention of yours regarding the death of Mr. Henry W. Sage, who for so many years was General Hickenlooper's right hand man in the management of the old Cincinnati Gas Light and Coke Company, of which corporation he was Secretary for 30 years or more. His death occurred in Lawrence, Kas., to which place he went on his relinquishing active business life in 1905. His wife and their daughter Pauline, accompanied him. He was in his 80th year, and is survived by his widow, two daughters, one son and a brother, Judge Sage. The remains were removed to Cincinnati for interment. The writer, who knew Mr. Sage for 32 years, wishes here to bear testimony to his worth as a citizen and to his merit as a man."

Mr. William A. Wood, Chief Engineer of the Boston Consolidated Gas Company, will be one of the speakers at the annual dinner of the Boston and New England alumni of the Syracuse (N. Y.) University, which is to be had in the Hotel Puritan, Boston, the evening of the 6th inst. The principal speaker will be Chancellor Day, of the Syracuse University.

This "wrinkle" may be well known to others, but 'tis a new one on us. The facts are from St. Louis, and the forwarder, even to his initials, writes to remain *incog.* "An advertising idea, combining argument, instruction and amusement, is about to be introduced by the Laclede Gas Light Company, in the form of motion pictures, showing the advantages of gas for cooking, heating and lighting over the cumbersome, unclean and inconvenient methods of other days. One of the films shows the kitchen of a hod-carrier's home. His wife is trying to prepare supper on and over a smoky stove, when 'Pat.' comes home, hungry and tired. They quarrel, the stove collapses and the comforts of home are scattered to the winds. Then comes the reverse. A cleanly lassie, spick-and-span as to dress, is reading in the kitchen while a meal is being cooked on the gas range. Then comes a love story illustrated which ends in accordance with the rules of happy endings. A third scene shows a bridal couple buying kitchen equipment. They drive in an automobile to the salesrooms of the Laclede Company to buy their kitchen supplies, etc., and ride away. Pictures of the Company's big storage holders, and of balloon's being inflated for flight are also shown. These pictures are shown in one of the picture halls, after the regular afternoon and evening exhibitions are given."

Ideal Bench Refractories.

[By Mr. George L. Johns.]

There has been of late a good deal of attention given by some gas engineers to this question, and very little progress has been made; but there are a number of reasons why the advance in this particular field has been slow. There has been, so far as I can find, practically no co-operation between manufacturer and user. The manufacturer has made up, what seemed to him, material best suited to the conditions, and the gas man has used these materials with varied success, sometimes getting very good results and again very poor service, from the same, or what were said to be the same materials.

The manufacturers, on the other hand, it seems to me, are working more or less in the dark. They sell their materials or benches, as the case may be, to the gas company and that is the last they see of it until some trouble develops with the bench. Then they make an examination, the retorts are sagged down or cracked, or the bench will not heat up properly, etc. The manufacturer says the bench was heated up too fast, or has been allowed to get away and become too hot; the retorts have been cracked and the recuperators made to leak, etc.

The gas man says the designs are poor, the furnace and flues are not large enough, the chimneys are not high enough and the material is no good. Quite likely both are right. The gas man places his next order elsewhere, only to meet with a like experience.

The manufacturer who thinks his bench and materials are not just right and begins to change his clay-mixes in retorts and tile, also his designs, is soon at sea. Then there is trouble for everyone concerned. The retorts and tile have a different shrinkage in drying and burning, and nothing fits when the bench is put up. When he gets his shrinkage right again, and changes all the moulds, he finds that his new mix is not as good as the old one. This change has probably extended over a period of 18 months or 2 years; it takes that long to find out if a retort is good or bad! There is a lot of this sort of thing going on all the time that the gas man knows nothing about. He is being experimented on without his knowledge, which condition of affairs is altogether wrong. Nor is the manufacture blamable for it.

The manufacturer and consumer should get together, making their experiments from both points of view and in a scientific way. There has been quite a good deal of miscellaneous experimental work recently done along these lines, by both gas engineers and material men. I have made a study of most of this matter obtainable and naturally have reached some conclusions.

There are materials now being used by manufacturers of refractories, which, if used in the gas bench, should give eminently better satisfaction than is now obtained.

I do not wish in this article to go deeply into the chemistry of the subject, for what is wanted is practical, not theoretical, ideal bench refractories. We must, however, know something about how to select the raw materials with which we are to deal. Our fireclay base is composed of silica and alumina in the following proportions: 53.77 per cent. silica and 46.23 per cent. alumina; this is in the burned state. Now, the important point is that, if we add silica to this base, we decrease its refractoriness but increase its conductivity. By adding alumina, we increase its refractoriness but decrease its conductivity. There is, however, one exception to this rule. If we add silica to our clay base we decrease its refractoriness until we reach a point where our mixture contains 85 per cent. or more silica. Then we find the refractoriness increased very rapidly with the addition of more silica, so that a material containing, say, 98 per cent. silica would have about the same fusion point as a material containing 51.35 per cent. silica and 45.34 per cent. alumina.

If now we use clays containing 45 per cent. alumina or more, and few impurities, we shall have a material which will be more refractory than the best silica brick and, at the same time, the best possible heat insulator. Reasoning from this, it seems to me what is wanted is a silica material where we desire refractoriness combined with heat conductivity; that is in the retorts and recuperator tile. The interior walls of the retort oven and furnace (the blocks composing the combustion chamber and furnace arch) should be made from material containing as high a percentage of alumina as possible, on account of its superior refractoriness and insulating qualities. To get high efficiency, radiation must be stopped; this is a very important factor, and one not given as much attention as it should receive.

Now, as to the tile used for retort settings—the most important tile in the bench in my estimation. Here we want a material that will carry heavy weight at high temperatures, and at the same time, will not shrink or disintegrate. The U. S. Geological clay testing laboratory, at Pittsburgh, Pa., has made some extensive experiments on fire clays at high temperatures under loads, and the conclusion was that the clays freest of impurities stood the best, and that the alumina and silica content did not have so much influence. The silica retort will expand when heated up, whereas the clay tile will shrink a little, so it seems to me, if we use silica retorts, we should use high grade, clay setting blocks. The clay block will carry the most weight if made of proper material.

The setting tiles should be made of a very pure clay, high enough in alumina to give sufficient refractoriness. They should be made from one kind, not from a mixture of clays. These blocks should not contain two materials, such as plastic and flint clay, which have different co efficients of expansion and contraction, and tend, under service condition in a bench, to disintegrate the tile.

If the clay for the settings were sufficiently pure, tile 3 inches wide could be used, instead of 6 inches as is now the general practice. This would make less material in the bench, give more retort surface exposed to the direct heat, with less material to heat up and keep hot. With silica recuperators the same efficiency should be gotten from a shallower bench. This would cut out a lot of material and mean a saving in the cost of benches. There is no doubt these high grade materials would be much more expensive as to first cost, but would show a very large saving in the end. The parts of the bench not mentioned above can be built of commercial firebrick of reasonably refractory materials.

The following are my ideas as to what the materials should be for the different parts of the bench:

Retorts and Recuperator Tile.—Should be made up of material containing not less than 85 per cent. silica and not over 3 per cent. of impurities. The material should be quite porous.

Furnace Arches and Combustion Chamber.—Material should contain (in burnt state) not less than 50 per cent. alumina, with not over 4½ per cent. of impurities. Material should be quite porous.

Furnace.—Material should contain (in burnt state) not less than 42 per cent. alumina, with not over 4½ per cent. impurities. Material should be quite dense.

Settings.—Material should contain (in burnt state) not less than 42 per cent. alumina with not over 4 per cent. impurities. Material should be quite porous. Tile should contain only one clay; no mixture of flint, and plastic.

I believe if these high grade materials were specified by the gas engineer it would have many good effects on the entire gas and fireclay industries; for the gas people would get better materials and better efficiency from their benches, and the clay man would be forced to establish chemical and physical laboratories, which would be of enormous benefit in every line of the firebrick trade.

The gas man should have a ceramic chemist make analysis of the materials as received from the manufacturer, so that he will know he is receiving what he has specified. He should also insist on the careful co operation of the clay man in the erecting and starting up of the benches and also provide for frequent inspection during the life of the bench, so that weak points in design or material may be discovered and corrected in the following installation.

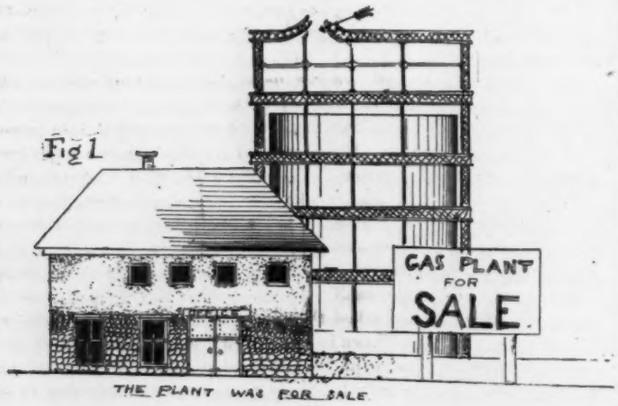
I hope this article may be the means of bringing the parties interested into closer touch, and may be the starting point of the development of ideal bench refractories.

Buying a Gas Plant.—Chapter I.

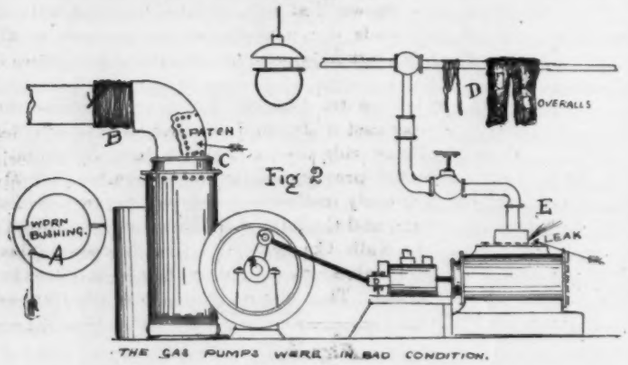
By "R."

A friend of mine who is a gas manufacturer recently purchased a gas plant. Having read an advertisement in the papers outlining an extraordinary opening for an energetic man desiring to obtain a good business with a moderate amount of capital, my friend, whom we can name Smith for this purpose, visited the representative of the gas works who had placed the advertisement and with him arranged to visit the works. The plant was a small one which had prospered until competition had interfered with the business. Electrical lighting plants and modern gas lighting appliances had been introduced by others. The works were also in a somewhat dilapidated condition, due to the illness of the former owner who could not give his attention to the equipment—it was located in a mill town of moderate size in the Middle States. Smith had been saving money all his life to get into the gas making business, and he had also acquired considerable knowledge of the industry, so he decided to buy the plant on the installment plan, after having made an investigation of things. He

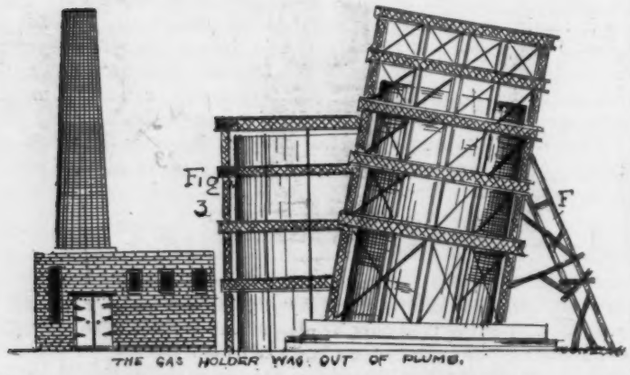
devoted a week to examining the equipment, which he found to be in wretched condition. The gasholders were of the single-lift and telescope pattern (there were two of them), and the top of the frame of one was broken, as shown in the illustration, Fig. 1. There was a big sign up offering the plant for sale. The office building was quite a neat little stone and concrete affair, in fact it was about the only building not full of broken windows and unhinged doors. However, as he did not expect to find everything in perfect order, and had calculated upon there being more or less breakage, shortage of stock, etc., Smith was not discouraged. He found the office books in very bad condition, and the former superintendent did not know just how much was due the company for gas, or how much the company owed; the term "company" is used because several other men were interested in the financial condition of the gas plant, although



THE PLANT WAS FOR SALE



THE GAS PUMPS WERE IN BAD CONDITION.



THE GAS HOLDER WAS OUT OF PLUMB.

Smith was the boss and Smith managed the whole thing until I bought it; which was shortly after he purchased it. I proceeded, first, to overhaul the place and try to get it on its feet. I interviewed the other men who were interested and got their approval to go ahead and set things to rights. I began with the mechanical equipment of the place. I had to invest considerable money in getting the gasholders repaired, one of which tilted over to a dangerous angle. In order to get this righted, a dozen men had to work on the foundation for a week, causing me an expenditure of $200. I had to have the office building cleaned and painted inside—the gasholders had to be painted also, and some of the plates had to be re-riveted. Corroded portions had to be cut out and new plates substituted. There was a good type of gas exhauster and a good high pressure pump was in use on the plant, but these were handicapped in the working by the worn parts, the defective adjustments and the rusted and binding portions. Fig. 2 shows the condition in one of the apartments in which the gas pumps were running.

A high pressure machine, with a 4-valve engine connected with a leather link flexible coupling, was struggling along with a jumping motion due to the worn condition of one of the journal bushings. I had the bushing removed, and it was in the condition shown at *A*, Fig. 2. In order to restore this bearing to proper shape an entire new bushing was substituted. At *B* one of the pipes was wound with a rope to cover a defect in the pipe where a leak had started. At *C* there was a good sized patch very crudely riveted to place. At *D* there could be found a piece of rope and a workman's overalls hanging over the pipe. At *E* there was a leak in the cylinder box of the engine and some steam and vapor shot out with a squeaking sound at every revolution of the engine. It looked like a discouraging proposition to get this department in proper shape, particularly as the boss of this place was drunk most of the time. I discharged him and got another in his place. In a week the new man had put things to rights, and I felt easier.

I found that practically all of the valves and pressure regulators of the plant were in bad shape. The retorts were in need of repairs and I paid out considerable good money getting these in form. The chutes for cooling the coke were clogged. The naphtha storage leaked and was dangerous. One of the gasholders was braced with some timber, as at *F*, Fig. 3. However, in a month I had placed things to rights, and in another month had gotten the office part of the works in shape and started in to advertise and do some business. I had been losing money right along, but I was gaining in experience.

I found shortages in many things and had occasion more than once to think that I had been cheated in the checking up. But I could not prove anything, and as it was my fault that I did not take more time and pains in checking the stock, I decided not to complain. I found that the account books were not correct, and was obliged to pay a few bills which the former owner had claimed were already paid; but, rather than have trouble, and as the amounts were small, settled the accounts. I also found that certain bills, which the man told me were due the gas works, had already been collected. These little things I regarded as errors on the part of the former manager, until too many of the like came to light. Still I could not sue the man without getting the laugh on me for being careless, and I just took things as they came and went at it with a will. I discharged the boozing and thieving employees of the works and hired new men. Then I started in to canvass the town for more business, and just how I got these gas works on their feet, and ultimately made money, I will relate in the next chapter of this article, as these were told me by Smith at the time.

Comments on Certain High Pressure Gas Distribution Problems.

[Prepared by Mr. L. H. Johnson, of Aurora, Ills., for the Sixth Annual Meeting, Illinois Gas Association.]

With the introduction of high pressure gas distribution there arose many initial problems, the solution of which assured the success of this system. With its adoption, however, there arose minor problems of construction and operation, which must be met by the distribution engineer in order to obtain entirely satisf actory results. These may arise from chemical, physical or from mechanical causes.

It is the purpose of this paper to bring to your attention certain of the problems encountered by the Western United Gas and Electric Company, in its high pressure system, some of which we believe we have successfully conquered, and others which are yet to be solved, in the hope that a discussion of some of these questions may be of interest and assistance to gas engineers who are engaged in, or are contemplating, high pressure gas distribution. No attempt has been made to classify the problems. A mere recital of them, and of the way in which we have endeavored to overcome the difficulties, is given.

Perhaps it would be well to give, first, a brief description of the system of the Western United Gas and Electric Company for the benefit of those who are unfamiliar with it. This Company supplies gas to 30 cities and towns in Will, Du Page, Kane, Cook and McHenry counties. The gas is supplied from 4 plants, located at Elgin, Joliet, Aurora and La Grange. All of the towns are connected by a high pressure pipe line and the 4 plants pump into this line at pressures

ranging from 40 to 60 pounds. The Aurora and Elgin plants send out a mixed gas and the Joliet and La Grange plants straight coal gas. In the 4 cities in which plants are located we distribute under low pressure direct from the holder, reinforcing the outlying districts from our pipe lines by the use of district governors. Five of the other towns have low pressure distribution systems, fed from the pipe line through 4-inch district governors. In the remainder of the towns gas is distributed under high pressure, directly to the consumer, Reynold's combination governors being used at each house.

The first problem we will consider is one which we have not yet solved, that of stoppages in main and service pipes. It is, strictly speaking, a manufacturing problem, but must be considered by distribution men on account of its effects. The problem consists—not in the remedy, but in the prevention. As a general rule it is comparatively easy to blow out any stoppage in a pipe where 40 or 50 pounds pressure are available, but this work always entails the cost of labor. There is also the constant danger of shutting off a consumer or consumers, so that satisfactory service can be obtained only through prevention. In our 8-inch pipe line, between Joliet and Aurora, we have encountered considerable trouble from a black powder which is deposited in the pipe line itself, and in smaller mains and services branching from it. This can always be blown out by opening the ends of mains or services where it is giving trouble. There seems to be a danger, however, of this powder working its way into our meters and seriously affecting them. It also prevents satisfactory results from the gate valves in our pipe line. An analysis of this powder shows it to contain 40 per cent. volatile matter and 60 per cent. non-volatile. The volatile matter appears to be made up of coal tar pitch or some substance of similar nature. The non-volatile part contains 94 per cent. of iron oxide, the remainder being made up of carbon, part of which is a decomposition product formed during the determination of the volatile matter, although there is, without doubt, a small portion of free carbon in the original powder.

Last fall we had a more serious stoppage in our 4-inch pipe line, between Elgin and St. Charles, caused by a substance composed principally of the same compounds in a different proportion. It had the consistency of pitch and was formed in sufficient quantity to almost stop up our pipe line. In endeavoring to clear out the pipe we first tried to find a cheap solvent for the substance, but found it insoluble in hot water, benzine, gasoline, naphtha, kerosene and alcohol. We found that it could be materially softened by steaming, so we hired a traction boiler and steamed the main in sections of approximately 500 feet, disconnecting at sleeves. When the substance was softened we connected up the main at one end and blew it out with gas. By this process we were able to get the main clear again. This deposit had a specific gravity of 1.38, and a melting point of 70° C. It had an ash of 16.4 per cent., which contained 90 per cent. iron oxide. In its composition and properties the organic portion resembled coal tar pitch, which may have been formed by a polymerization of some of the constituents of the gas and separated by the cooling it undergoes in passing through the pipes; or it may have been already formed and may exist in the form of vapor upon entering the pipes, where it may have been deposited with the iron oxide; as this settled the particles of iron oxide formed nuclei around which the pitchy matter deposits.

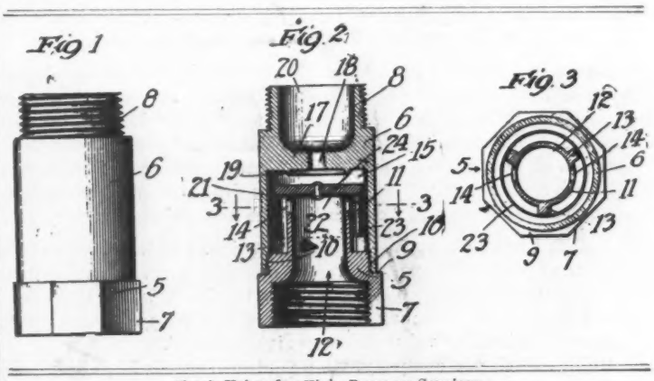
Near our La Grange plant we have had but one instance of stoppage. This was similar to that found near the Elgin plant. Around Aurora we have had no trouble. Elgin is the only town in which we have encountered any of these deposits in our low pressure mains. This one case, however, would seem to preclude any theory that high pressure has any bearing on the formation of these substances, but the fact remains that it has more serious results in high pressure systems than in those in which gas is distributed under low pressure.

Having now introduced the subject of deposits in high pressure mains I will pass on to one of its most troublesome results; that is, its effects on the efficiency of the valves. It is, of course, obvious that, with any foreign substance in the mains, there is always the liability of some of this substance lodging under the gate of a gate valve, thereby rendering it ineffective. Because of this difficulty we have experimented with globe valves. The question of their throttling effect was brought up, and, in order to determine how much reduction in pressure would be caused by one of these valves, we tested a 2-inch valve passing different amounts of gas at initial pressures of 10, 15, 20, 25 and 30 pounds. The amount of gas passed ranged from 3,900 to 11,700 cubic feet per hour. The greatest drop obtained was naturally obtained under the most extreme conditions, 11,700 cubic feet per hour, with an initial pressure of 10 pounds. This amounted to 8 inches of water, an amount practically negligible when we are considering high pressure work. We have had fairly satisfactory results with these valves, as far as shutting off the gas is concerned; but they have the disadvantage of being harder to pack than a gate valve when there is pressure on the line. During the coming year we expect to install some gate valves with holes tapped in the bottom of the bodies, hoping to be able to blow the valve seats clear, thereby obtaining more satisfactory results.

The most important problem confronting gas engineers is that of safeguarding the consumers from any possible accident to life or property. In high pressure distribution this is especially necessary, and with this end in view the practice of installing safety vents originated. This installation in itself does not insure safety, however. Experience has shown that it is necessary to have them inspected frequently in order to see that they are not stopped up from ice, dirt or by the consumer. Vent pipes do not, however, necessarily protect against accidents, and it is to this fact that I wish to call particular attention.

As previously remarked, we are using Reynolds combination governors in houses which we supply directly by high pressure. We have had two cases of explosions of meters caused by diaphragms of the governors breaking. Fortunately both of these cases occurred in summer, when there were no furnace fires in the cellars and the windows were open, so that it was possible to get the gas shut off before it became ignited It can readily be seen, however, that very serious damage might result from an accident of this kind. An investigation of the governors revealed the fact that the diaphragm had split at the end of the casting. The rush of gas escaping through the inlet to the seal had sucked the leather across the hole, thus shutting it off completely. There is a small air vent above the top of the diaphragm through which part of the gas escapes into the vent pipe, but this is not sufficiently large to take the full amount of gas. Later experiments have shown that in a case of this kind, with an initial pressnre of 40 pounds, it is possible for the pressure on the meter to go as high as 25 pounds, a pressure far beyond the limits of safety.

The first remedy which we tried for this defect was to have the lower halves of governors cast with two radial ridges, one on either side of the opening. These ridges were about ¼ inch high, and it was hoped that these would prevent the leather from closing off the hole. These proved absolutely ineffectual, as the leather was sucked down between these ridges and the hole closed off as before. Mr. C. W. Lockwood, of the De Kalb County (Ills.) Gas Company, then developed a vertical check valve which we have adopted to prevent a repetition of these accidents. This check valve, patent drawings of



Check Valve for High Pressure Services.

which are shown in the plate, is placed between the lock cock and the regulator. The action of this valve is as follows:

During ordinary consumption the gas travels up through the passage way, No. 12, out through $\frac{3}{16}$-inch holes, No. 14, down beneath the bottom edge of the brass cap, No. 23, and out through the opening, No. 18. A sudden rush of gas, such as is occasioned by the bursting of a diaphragm, throws the cap, No. 23, which has a leather seat, No. 24, upward, holding it against a valve seat and sealing off the opening, No. 18.

We are installing these check valves on all services which carry our full line pressure. Wherever it is possible we are installing reducing regulators on the feed lines into towns, cutting the pressure down to 10 pounds. Thus we are able to transmit under 40 to 50 pounds pressure while we distribute under pressure low enough to insure against accidents from exploding meters. This method of distribution has also the further recommendation of tending to reduce

leakage. It seems to be ideal in every regard but one; that is, it reduces the storage capacity of the pipe line.

A question which frequently rises in high pressure distribution is that of the smallest main which it is advisable to lay. The question of leakage should be considered in deciding this question. If leakage in mains is proportional to the circumference of the mains it would seem that we should lay as small mains as possible. Another point to be taken into consideration is connecting up services. Mains of 1 inch size or smaller can be cut and tees inserted, but this entails the cost of notifying other consumers on this main and the shutting off of the gas. The smallest service clamp which will give satisfactory results is 1¼ inches. As the difference in cost between 1¼, 1½ and 1 inch pipe is slight, we have adopted 1¼-inch as our smallest main.

One practice in high pressure distribution that will be found in all extremes in different gas companies, is in the use of patent couplings for expansion joints. Many of the natural gas pipe lines have these couplings at every joint, and some companies distributing artificial gas under high pressure have adopted this same practice. Many companies place these couplings at various intervals, while some companies use none of these couplings at all, making no allowance for contraction or expansion. In the past the Western United Gas and Electric Company has made a practice of placing expansion joints at intervals of 500 feet. Our experience, however, has been that, in many cases, there are no indications that these couplings have acted in the capacity intended, probably due to the fact that the friction of the ground prevented any noticeable movement in the pipe. In places where there has been any appreciable movement we have encountered trouble from leaks, caused either by the rubber gaskets wearing, or by their rolling. In the instances where no contraction or expansion is found we have experienced no difficulty from the pipe pulling apart, and it is a question whether it is advisable to use this type of coupling except in cases of constructional necessity. Is this not an opportunity to reduce some of the ever present leakage?

In conclusion I wish to say there is only one right way of doing things, and a comparison of our various experiences will surely help us to the determintion of that way. It is the writer's hope that we may hear from those who have encountered any of these problems and from those who have still others perplexing them, that we may help each other in their solution.

The Calorific Value of Gas in Wisconsin Cities.

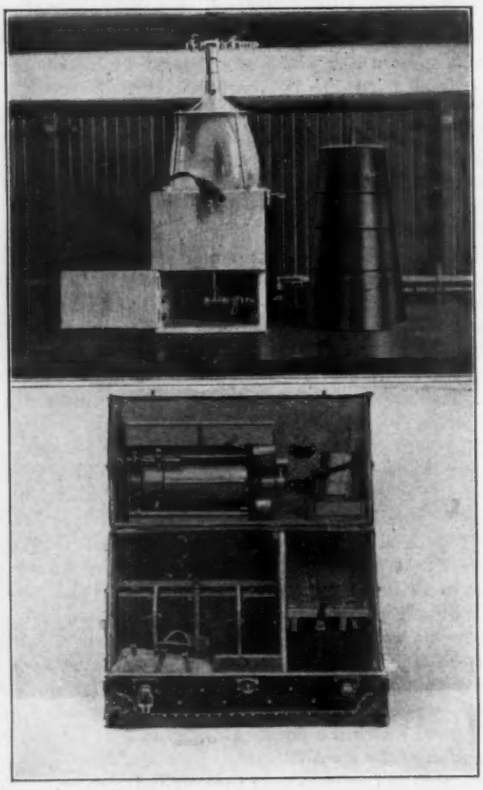
[Prepared for the Sixth Annual Meeting, Illinois Gas Association, by Mr. C. F. Burgess and Mr. W. J. Huddle, Madison, Wis.]

Under the Public Utilities Law of Wisconsin, the Railroad Commission has adopted certain standards for gas and electric service. These are published in a bulletin designated as No. U-21, dated July 24, 1908. The administration of these standards involves periodic inspection of each of the plants, and it is the purpose of this paper to set forth some results of and conclusions drawn from inspections relating to the rules 8 and 9 concerning the heat value of gas.

Rule 8. The company furnishing gas which, within a 1-mile radius from the distribution center, gives a monthly average total heating value of not less than 600 B.T.U., with a minimum which shall never fall below 550 B.T.U., may be considered as giving adequate service as far as the heating value of the gas is concerned.

Rule 9. Each gas company, whose output exceeds 20 million cubic feet a year, shall equip itself with a standard calorimeter outfit, with which periodic tests upon the gas shall be made. A record of these tests shall be made and kept open for public inspection.

At the time of the adoption of the standards but few of the gas companies were equipped with calorimeters, and the check on the heating values made by the State Inspector shows a fair degree of uniformity in the gas, and the uniformity and quality of gas have been found to be improved after the adoption and use of a calorimeter as part of the plant's operating equipment. It may be noted that some of the plants have increased their calorific values since the adoption of the standards, so that practically all the coal and water gas plants are now fully meeting the requirements; and it is of interest to note also that there has been no tendency for those plants furnishing gas at a calorific value higher than 600 B.T.U. to reduce the values even though permitted to under the adopted standards. When it was proposed to adopt a heating value standard in Wisconsin, to the exclusion of the candle power requirement, much doubt was expressed as to its expediency, and as to the ability of gas plants in Wisconsin to meet the values proposed.



Inspector's Traveling Equipment.

For this reason, and on account of the generally increasing interest in heat value standards, it is believed that a table showing the results of all tests made by Inspectors in Wisconsin may be of interest. The following table shows the results of all tests made from July 1, 1908, to January 1, 1910, at 30 of the gas plants. Nineteen of these are manufacturing coal gas, 8 are producing water gas, 2 make the gas from oil, and 1 is furnishing coke oven gas. Tests have also been made on the gasoline plants. These are unable to comply with the standards, and the manufacture of gasoline gas has been made the subject of a special investigation, the results of which need not be considered here.

It is required that each gas plant whose output exceeds 20 million cubic feet a year shall equip itself with a standard calorimeter outfit, with which periodic tests shall be made. This requirement is in recognition of the fact that the purchase of a calorimeter equipment may be an unwarranted burden on the smaller plants, and in such cases the tests made by the inspectors furnished a fairly adequate check upon the plant operation.

Most of the plants are now equipped with calorimeter appliances, and this includes even some of the smaller plants that are not required to do this under the rules. The Inspectors carry their own equipment, which is standardized from time-to-time in the Chemical Engineering Laboratories of the University of Wisconsin. They have been handicapped to some extent in securing the most accurate results, through the fact that many of the gas plants did not have storage tanks from which water could be obtained at constant and room temperatures. This condition is being improved through the installation of such tanks. For the values given in the following table correction has been made for errors due to the use of water below room temperatures, and it is believed that the values are fairly accurate.

In this table the cities are designated only by number. The number of inspections made at each place is given in the third column, and it may be noted here that under present arrangements inspections are being made more frequently than in the past. At each inspection a number of series of readings are taken throughout the day. The results of each series of readings taken are averaged and such averages given in the last column.

Summaries of Heat Values, July 1, 1908, to January 1, 1910.

City.	Kind of Gas.	No. of Visits.	Month.	No. of Determinations in Each Set of Readings.	Average Heat Value of Each Set B.T.U.
1.....	Coal	2	August, 1908	4	618
			" "	5	616
			" "	5	633
			" "	4	630
			February, 1909	5	594
			" "	5	603
2.....	Water	3	November, 1908	5	688
			" "	5	683
			" "	5	692
			September, 1909	4	641
			November, 1909	8	660
3.....	Coal	2	September, 1908	3	587
			" "	3	698
			October, 1909	10	571
			" "	9	571
4	Coal	4	August, 1908	5	610
			" "	5	636
			" "	5	613
			" "	5	614
			" "	3	660
			February, 1909	5	658
			July, 1909	3	653
			" "	4	664
			October, 1909	6	590
5.....	Coal	2	September, 1908	5	517
			" "	5	355
			" "	3	510
			August, 1909	4	636
6.....	Coal	3	February, 1908	5	637
			" "	5	627
			August, 1908	5	616
			" "	3	598
			" "	5	629
			" "	3	630
			August, 1909	4	664
			" "	3	601
7.....	Coal	3	February, 1908	5	633
			" "	4	621
			" "	4	643
			" "	4	620
			August, 1908	4	618
			" "	4	600
			" "	5	602
			" "	4	597
			July, 1909	4	575
			" "	4	566
			" "	2	570
			" "	3	619
			" "	3	551
8.....	Water	1	December, 1903	4	669
			" "	4	666
			" "	4	666
9.....	Coal	2	January, 1908	4	635
			" "	3	628
			" "	5	613
			September, 1909	4	586
			" "	6	574
10.....	Coal	2	October, 1908	3	640
			" "	4	646
			" "	5	633
			" "	5	631
			" "	3	643
			May, 1909	5	625
			" "	4	608
11.....	Coal	3	August, 1908	4	628
			" "	5	628
			" "	4	639
			February, 1909	5	624
			August, 1909	4	572
			" "	3	627
12.....	Coal	4	August, 1908	4	599
			" "	4	592
			" "	3	604
			" "	4	592
			" "	5	578
			" "	4	594
			February, 1909	5	644
			" "	4	639
			July, 1909	3	641
			" "	3	660
			" "	3	632
			October, 1909	4	596
13	Oil	3	September, 1908	5	504
			" "	3	491
			August, 1909	5	467
			October, 1909	15	564
14.....	Coal	2	August, 1908	4	610
			" "	4	614
			" "	5	613
			" "	5	631
			February, 1909	5	642
15.....	Coal	3	January, 1909	4	626
			" "	4	638
			September, 1909	6	636
			November, 1909	15	630
16	Coal	1	June, 1909	2	582
17.....	Water	2	January, 1909	5	609
			" "	5	601
			" "	4	589
			November, 1909	10	594
18.....	Oil	4	August, 1908	5	919
			" "	5	926
			" "	5	934
			February, 1009	5	928
			" "	5	884
			August, 1909	3	897
			" "	2	886
			October, 1909	6	822
			" "	6	859
19.....	Coal	3	August, 1908	5	646
			" "	5	648
			" "	5	671
			" "	5	670
			February, 1909	4	689
			" "	5	672
			August, 1909	3	676
			" "	3	628
20.....	Coal	3	January, 1909	4	626
			" "	5	620
			September, 1909	3	676
			November, 1909	15	628
21.....	Water	3	March, 1909	5	591
			" "	5	635
			September, 1909	6	641
			December, 1909	5	657
			" "	5	649
22.....	Coke Oven	2	March, 1909	5	581
			" "	4	582
			" "	5	581
			" "	5	583
			August, 1909	3	636
23.....	Coal	2	February, 1909	5	614
			" "	4	597
			" "	4	603
			October, 1909	6	632
24	Coal	3	August, 1908	5	638
			" "	5	635
			" "	5	631
			" "	4	644
			June, 1909	4	590
			October, 1909	6	629
25.....	Coal	2	January, 1909	5	636
			" "	5	525
			" "	5	558
			" "	5	560
			" "	4	653
			November, 1909	5	670
			" "	5	640
			" "	5	624
26	Water	2	May, 1909	5	621
			December, 1909	5	597
			" "	4	598
27.....	Water	2	September, 1908	3	556
			" "	3	558
			August, 1909	5	685
			" "	2	683
28.....	Water	2	September, 1909	5	608
			November, 1909	10	680
29	Water	2	October, 1909	14	541
			December, 1909	6	547
			" "	15	547
30	Coal	1	" "	10	663

Tar Macadam Roads.

[Prepared by MR. F. E. NEWBERRY, Kankakee, Ills., for the Sixth Annual Meeting, Illinois Gas Association.]

Situated as we are with an abundance of limestone at our command, the city owning and operating its own quarry that has been in active operation for the past 10 years, we have in this city at the present time over 40 miles of stone macadam roads. These streets have been built, not by special assessment but from the general tax fund. Each year the city expends from $15,000 to $20,000 in the building of new streets and in the maintenance thereof. Our city is situate on a rise of ground which gradually slopes south to the river. One of the problems our city engineer and also our street commissioner have to meet is the gradual but constant loss of the loose shale or top dressing from the streets. There is no trouble in locating it when it has gone, for we have it in our homes; we find it on the piano, in the

book cases and on our tables at each meal. Our storm sewers also are full of it. We spend a considerable amount of our road appropriation each year in cleaning our storm sewers and removing from them the light stone or top dressing that we are at the present time applying to our roadways. In many cases the storm sewers have to be taken up and cleaned by hand, the sediment being so great that we are unable to chain it out and make them effective. You will see that an expenditure of this kind, which comes every year, is somewhat costly and is not a good business proposition. Naturally, our city authorities have been looking for some means of eliminating this trouble.

The continued increase in the number of motor-driven vehicles in use at the present time is simply amazing. There are at the present time in active operation and under license 244,245 automobiles. There is also at the present time a yearly output of 95,000 motor-driven cars. It has been plainly demonstrated that the evolution of motor-driven vehicles has thrust upon the public authorities, such as the highway commissioner and the city engineer, the necessity of producing something in the way of a more permanent street macadam surface that will withstand the excessive wear that the motor driven car is causing. If we take a retrospective view of our city and country roads of 10 years ago, when there was nothing but the ordinary farm wagon and family surrey in active use in the rural districts, and in the city, the heavy truck and teaming wagons, delivery wagons and light carriages for family use, we will see, by looking over comparative conditions, that while there was formerly no demand for anything better than the gravel or stone macadam roadway, at the present time, in cities of a population of from 25,000 to 50,000 people, in which there are from 2,000 to 4,000 automobiles in active use, both public and private, the old stone and gravel macadam roadways are entirely beyond practical consideration. They simply will not stand the excessive speed that the motor-driven car has attained. The speed and consequent tire suction of our motor-driven cars are to day wrecking our roadways, and to this end there must be some form of cheap paving or top dressing applied to them so as to maintain the present investments that our commonwealths have made. And, therefore, as a pertinent subject at this time, I have prepared this paper on "Tar Macadam," which I contend is the best and cheapest top dressing that can be applied to either city or country roads to preserve them against the automobile travel of to-day.

To this end, 3 years ago, I decided to endeavor to construct one sample block of tar macadam roadway on a macadam road properly crowned with a size No. 2 limestone. I might state that I had considerable difficulty in persuading our city authorities to give me the permission to even furnish the tar for this roadway free of charge. They had their doubts in regard to its durability. They informed me that it would make a sticky, nasty muss on the street, and that the residents living along the street would not tolerate it. I labored incessantly with the Mayor and Street Commissioner for about a year, and finally succeeded in obtaining the Mayor's permission, after personally taking several of the residents to him and talking tar macadam dressing; but, even then, after the permission was granted, I was positive that they had their doubts as to my experiment being of any practical use. During the year 1907 the city authorities had considerable new work in the way of street building. I bided my time until they started to rebuild two blocks of stone macadam streets that lay with a considerable grade on a side hill. The street in question had been paved with stone macadam some 3 years previously. The action of the water after each rainfall had a tendency to form large fissures in the street which made traffic almost impossible. Here was my opportunity to try my experiment. I, therefore, as stated before, again pleaded with the Mayor and took some of the residents with me, even making calls at his home in the evening. With some reluctancy he consented to having the Street Commissioner co-operate with me in the laying of one of the blocks with a tar macadam roadway. I gave the Street Commissioner a free hand as to the amount of tar that was to be used in this block. I had figured that approximately twenty 50-gallon barrels, or 1,000 gallons, would be sufficient tar to demonstrate my argument.

You will understand that we had no facilities whatever for putting this tar on in a cheap and economical way. The only thing we had available was a 100-gallon tar kettle on wheels, and I succeeded in getting the city to purchase four 10-gallon sprinkling cans. The nozzles of these cans were taken to the tin shop and were perforated with holes of a diameter of $\frac{1}{8}$ of an inch; so we were ready to start in our crude way. I requested that the street be well crowned by using a No. 2 limestone. This was done, and, after the street had been entirely filled and crowned, there was put on this street water from the city hydrants for several hours. The Street Commissioner secured the fire hose and the street was flooded completely. The block was then fenced off and no traffic allowed on the same for 3 full days. On the fourth day the street was again gone over with a 20-ton steam roller and brought to its final crown. The effect of the water on the stone that had first been laid and crowned was very noticeable and quite surprising. After the second rolling the street was practically in perfect condition, having undergone the settling process by means of the water.

The tar was hauled from the gas works in 50 gallon barrels. We emptied these barrels in the tar kettle by means of a plank from the wagon. It was impossible for me to be present at all times, inasmuch as I had other work that had to receive attention. We had a very fair start with the tar and everything was going along nicely when I was called away to attend other matters; but before leaving I instructed the men very carefully not to put too much tar in the kettle and to watch the fire very carefully to prevent boiling over with consequent fire danger. I had scarcely gone 2 blocks when I looked around and discovered a great volume of smoke ascending. I immediately returned on a run and found that the men had done exactly what I had told them not do, with the result that I had a flowing river of fire going down all sides of our newly crowned street. After much difficulty we succeeded in quenching the fire and quieting the troubled tar. After this experience I deemed it advisable to stay pretty close to the base of operation until the block was finished.

A statement of the character of the tar used will be in order at this point. This was ordinary coal gas tar, direct from our works, which, however, received careful handling and had been allowed to settle for some time in the presence of heat. The tar passes, first, to a small receiving well, from which it is pumped periodically into a large settling well. The tar used on this street was allowed to settle in this large well without disturbance for about a month, and a small steam coil was kept running in the well. In this manner we undoubtedly eliminated a considerable amount of water from the tar. The writer believes that ordinary coal tar, boiled free of water with a steam coil, is as good for tar macadam as any other preparation that can be devised. Of course, in a properly made steam still the operation would take but a short time, and a fine tar of this character could be easily prepared by any gas company properly equipped.

The actual operations of applying this tar to the crowned surface of this street was done by means of 10-gallon sprinkler cans. We took 4 men and put them abreast, and had additional help waiting on these, bringing the hot tar to them as fast as their cans were empty. The tar kettle was moved ahead as fast as we advanced, and always kept boiling and a fresh supply of tar always on hand to replenish the kettle. Directly behind the men with the sprinkler cans were other men who took limestone shale rock from a wide-tired wagon and spread the same on the hot tar. Directly behind this gang of men came our 20-ton steam roller, that worked back and forth, constantly crowding the limestone shale rock into the hot tar. We were unable to finish this street complete in one day because of the accident in starting. Consequently it had to lay over until the next day. Operations were again resumed early the second day. When the street was completed after the shale had been all applied the roller was operated from one side of the block to the other, first on the right then on the left side, and so on until it reached the center of the street. These operations were continued for a period of 2 or 3 hours, at which time the street was considered finished with the exception of closing it off from traffic for a period of 3 days—which was done. So the stone had ample time to take up the hot tar that had been applied. Fortunately we had good weather and all conditions were favorable. After a period of 3 days the street was again opened to traffic. The traffic on this residence street should have been restricted to nothing but buggies, light wagons and motor-driven cars, but it seemed that everybody that owned a heavy wagon, a stone wagon or a threshing machine had occasion to go this way, and although there has been no restriction of any kind on traffic since the day it was opened, it is to-day in nearly as good condition as on that day. There are now two or three places on this street where the top dressing of limestone shale rock is somewhat worn off. These places are directly in the center where the traffic is the heaviest. I have taken a chisel and a hammer and penetrated the surface of the street only to find that there yet remains tar macadam to the depth of $\frac{1}{2}$ inch on these particular places, showing conclusively that the warm tar penetrated the stone to the depth of at least $\frac{1}{2}$ of an inch, thus giving us a permanent binder with the No. 2 stone. As

stated, this block is still in good condition, but the other of the two blocks, not included in my permission from the authorities, and which was laid with plain, ordinary macadam, is to-day nearly worn out, and has been for some time in a badly washed and eroded condition. We taxpayers on the two blocks in question appreciate this object lesson as do all others who investigate.

It might be stated at this point that the tar macadam block in question, as constructed, measures 400 feet in length and 30 feet in width. There were two approaches to be treated in connection with the block proper. Taking the block 400 feet in length and 30 feet in width, gives us 1,333⅓ square yards; the approaches, being 30 feet wide by 20 feet long, give us 66⅔ square yards each; or a total of 1,466 square yards of macadam surface that was treated. The amount of tar used to surface this amount of space was 1,300 gallons, at a price of 5 cents per gallon, or $65. There was a labor charge of $20 in connection with the tar as applied, making a total charge of $85 for the entire block—tar and labor—which figures 5.8 cents per square yard.

Taking the figures of our Street Commissioner, as to the actual cost to produce one block of stone macadam in a finished condition, he gives me the figures of $1.25 per cubic yard. Adding our cost of 5.8 cents to this, we have in this block a total cost of $1.308 per square yard.

Let us consider for a moment the use of oil which is received so favorably by many city authorities. Our city Street Commissioner has given me the following figures on oil dressing: City's first cost per square yard, $1.25; oil per square yard, 28.8 cents; total cost of new block, including stone and oil, $1.538, as against a tar cost of $1.308, or 23 cents per square yard in favor of tar. We must further remember, in considering the uses of oil, that any average block requires sixteen 50-gallon barrels of oil applied every 4 months to effectively lay the dust, or a total of thirty-two 50-gallon barrels—1,600 gallons—at 5 cents per gallon, or $80 per block every 8 months or season for oil alone. In addition to this there is a labor charge of $7.50 each time the 16 barrels are applied, or $15 every 8 months. On the other hand, it is safe to figure on a duration of 3 years for tar mac adam without any renewals, and this is a low estimate.

Considering, now, the comparative costs of the other fairly permanent pavements, let us take up first one of the well-known patent tar pavements. The minimum amount of this preparation per square yard is given us as 1¼ gallons at a price of 9 cents per gallon, or a total of 11 cents per square yard. Taking this cost in connection with our first cost of stone at $1.25 per cubic yard, we have a total cost of $1.36. Taking our total tar cost of $1.308, we have 5.2 cents in favor of unrefined tar as against the patent preparation, provided there is no difference in life, and the writer believes there is practically none.

Another form of paving that is being given considerable attention is the "Sarco" preparation, the figures for which were obtained from our City Engineer. He stated that the cost of "Sarco" was $1.73 per square yard, which is machine mixed. This "Sarco" is laid at a thickness of 2 inches on top of a 6-inch concrete base. The cost of the 6-inch concrete base being 65 cents per square yard, leaves $1.08 per square yard for the "Sarco" preparation. The claim for "Sarco" pavement is from 10 to 20 years. Taking, for argument's sake, 15 years as the average life of "Sarco" pavement, or a cost of 21.6 cents for 3 years, we have the following results: Tar for 3 years, 5.8 cents; "Sarco" for three years, 21.6 cents, or 15.8 cents in favor of tar.

There is yet another form of permanent pavement that we have not considered, and while it is unlikely that the same would be considered seriously by smaller towns and villages, owing to its cost, yet we will make the comparison. The pavement I refer to is "Asphalt." The cost is $1.90 per square yard, laid to the depth of 2 inches, and, having a concrete base, which is worth 65 cents per square yard, we have a net cost for the "Asphalt" covering and binder of $1.25 per square yard. Making a comparison on a 3-year base, and allowing a 15-year life for "Asphalt," we find that the latter cost, at the rate of 25 cents per square yard, as against a tar cost of 5.8 cents, or 19.2 cents in favor of tar.

There is yet another form of pavement, this being a 6-inch concrete base, with a hard brick surface. This is at the extreme cost of $2.25 per cubic yard, and I will not attempt a further comparison, inasmuch as there are no figures to quote as to the life of brick paving.

You will see by the above figures that tar macadam has a decided advantage not only as to cost but also as to durability. I consider

Exhibit "A."—Showing block of Tar Macadam Roadway; not swept or cleaned since the day it was opened for traffic. Has been in use for 1 year and 9 months.

Exhibit "B."—Showing west side of 600-foot concrete bridge treated with road oil; west side just opened for traffic; looking south. Oil was permitted to lie on surface for two days prior to opening for traffic.

Exhibit "C."—600-foot concrete bridge looking south on west side, 24 hours after being thrown open to traffic; treated with road oil; oil permitted to lie on surface for 2 days prior to opening to traffic; note condition of sidewalk as to oil treatment.

Exhibit "D."—600-foot concrete bridge showing surface condition of oil roadway.

Exhibit "E."—Indiana avenue, 1¼ miles in length, showing street in process of cleaning which is done twice each year. The greater part of refuse is loose shale rock.

Exhibit "F."—Harrison avenue, 1¼ miles in length, showing the same undergoing the cleaning process, which is done twice a year. The majority of the refuse is loose shale rock.

Exhibit "G."—Indiana avenue, showing street gang in active operation, removing shale dust from street.

the 3-year average very low for tar macadam; I am quite positive that the same could be figured on a 5-year basis and leave its nearest competitors far in the rear.

An exceedingly good argument for tar macadam in communities, where macadam roads have been hitherto laid or could be laid economically, is that the laying of such roads can be entirely and properly done by the local authorities, and the locality thereby saved the contractors' profit, or the profits of any trade combination or patents, and the necessary tar can always be obtained from some neighboring gas works at a fair price.

Taking the above figures into consideration I think it behooves both the National and State authorities, through the co-operation of our representatives in Congress and our local legislative bodies, to bring about good road measures whereby National and State aid will be given, so that in due course of time we will gradually acquire a system of roads not only for the pleasure seekers with their motor cars, but for the marketing of our farm products, so that these products may be brought to points of transportation at a minimum cost with ease and comfort.

Tar Treatment of Roads.

[Prepared by MR. T. P. SHARPLES, Boston, Mass., for the 6th Annual Meeting, Illinois Gas Association.]

The modern use of tar in treatment of roads began at Nice, in France, in 1901. The first extensive work was carried on by Dr. Guglielminetti and was so promising that the experiments were carried further. Nice was a particularly fortunate locality in which to begin this work, as the results could be quickly noted, since the roads were limestone and ground up very quickly under traffic, forming a very fine, flourlike dust, which was easily raised by automobiles, to the annoyance of both the passer by and the dweller along the roadside. From this experimental beginning, in 1901, the business has grown to be an important industry in France. Several large companies have been organized to carry on the work, and of these the "Société Générale de Goudronnage des Routes," operating the Lassailly machines, is the largest, and tars several million square yards annually.

In France much work is done by machines, and they have been brought to a great state of perfection. These may be roughly divided into two types—those using brushes, or "squeegees" to evenly distribute the tar, and those which use a direct spray. The most prominent type using a brush is the Lassailly, which was introduced in 1905. The heating and the tarring machines are separate, allowing the heating of a second batch of tar to be carried on while the first is being spread. The larger machines usually hold a barrel of prepared tar and have a capacity of 700 gallons an hour. The distribution apparatus is simple, being merely a perforated tube with proper valves to allow the tar to run onto the road, and a system of following brushes to even off the tar on the road. With a machine of this type it is possible to tar 16,000 square yards a day, with a very low cost per square yard. Another type of machine using brushes is the Bacri, in which the heating apparatus is mounted on the same truck with the brushes. Other prominent types used in Europe are those of G. Breining, a German machine, and that of Salvisberg & Cie, of Fribourg.

Of the machines without brushes, that of J. Voisembert and P. Hedeline, of Paris, is the most used. The tar is sprayed by directing a jet at high pressure against a small ribbed plate, which breaks the jet up into a fine spray. The company which controls this machine for France, Messrs. A. & G. Brun, of Grenoble, rivals the "Société Générale de Goudronnage des Routes" in the area treated.

In England the tar painting work, as it is called, is carried on by large companies, in the same way that it is done in France. The most prominent concern is the "Tar Road Syndicate Company," which carries on a very extensive business, using machines of several different types. The Voisembert & Hedeline machine has been much used.

Another type of machine is that developed by Thomas Aitken, of Cupar-Fife, Scotland. The apparatus is mounted on a large steam automobile truck, of a type now common on the English roads, having tank capacity of 1,000 gallons of prepared tar. The spraying apparatus is mounted on the after end of the truck, and the tar is pumped, by pumps geared on to the driving axle, into an intermediate cylinder, from which it is sprayed by air pressure onto the road. The pressure drives the tar at a very high velocity and coats the road evenly, while the machine travels at the rate of 3 or 4 miles an hour. A smaller type of the same machine is drawn by horse power. In general, the English work seems superior to the French work and is much more widely distributed. Some of the best work is seen in the smaller towns, where the work is carried on by both the towns and the county surveyors.

Several very fine examples of surface tarring are seen in Paris, France, noticeably the Bois de Boulogne, where the French engineers claim a saving is made of 2,000 francs a year in maintenance by the use of the surface tar treatment. L'Avenue de la Grande-Armeé is another excellent type of tarring example, and it was no doubt on account of these excellent examples that the International Road Congress, Paris, 1908, reported so favorably on the use of tar as a dust layer, singling tar out as the only substance for particular commendation.

In the United States the use of tars for road purposes was begun, in 1905, at Jackson, Tenn., by the Public Roads Office, Department of Agriculture. As in France and England, it was early determined that refined tars produced the best work. Of these specially prepared road tars, Tarvia has been the most extensively used. Among th

early roads treated were the South Park system, of Chicago; the Metropolitan Park system, of Boston; and the Newton boulevard in Newton, Mass. In Boston these two great automobile thoroughfares have been maintained in the same way up to the present time.

It has been recognized, from the experience both abroad and in the United States, that very rigid conditions are necessary for the best results with surface treatment with tar. Among the most important conditions to be fulfilled are:

1. The road must be of the best macadam construction.
2. The road materials must be of good quality.
3. The tar must be prepared tar of the proper consistency.
4. The road must be dry, warm and clean when the application is made.
5. The prepared tar must be hot when applied, and must be spread evenly and to the proper thickness.
6. The coating must be covered with a hard, resisting material—preferably trap rock screenings.

Roads treated under favorable conditions, and subjected to certain classes of traffic, have shown remarkable wearing qualities. A portion of the Newton boulevard, treated in 1906, has resisted an abnormally large automobile traffic up to the present time, with little or no repairs. If heavy horse traffic accompanies the automobile traffic the surface succumbs more quickly to the wear.

The application of hot materials to the road has, in many cases, with the absence of special machines, proved too expensive an undertaking for smaller communities. In order that the tar may be applied cold it has become the practice, both in parts of France and in the United States, to use a thinner tar preparation, that it may be applied without heating. An experience through several years with this form of material has shown that, while not showing the lasting qualities of the heavier hot coating, it still has great merit as a dust layer and as a road preserver. In France the Auvergne Automobile Circuit for the Gordon Bennett cup was tarred with this material, and in the United States many good examples may be seen of this class of tarring. The cities of Somerville and Newton, Mass., have for the last 2 years used large quantities in treating residential districts, with very pleasing results from both an economic and aesthetic standpoint. As in the hot painting methods, the macadam roads must be in proper condition if the best results are to be obtained. The success in the use of tar as a surface application has led to the development of different forms of construction work, using prepared tars. Several types of construction have become prominent in macadam road work, and may be classified as follows:

1. The mixing method, in which the stone is coated before being placed in position on the road.
2. The penetration method, in which the stone is coated in place on the road during its construction.

The tarring of road materials is not a new process, as experiments have been carried on for many years in the construction of roads with tars and coal tar pitches. In New England many notable examples of good tar concrete construction work may be seen. In Manchester, N. H., Chestnut street was laid more than 30 years ago with a tar concrete made of tar, coal tar pitch and a local gravel. It is to-day in good condition, and has outlasted an adjacent asphalt street put down at the same time. These old experiments, made with crude materials, required great skill and judgment on the part of the operator to produce good results. A man was never sure of this work, as he was never sure what was in the tar which went into the mixture, and he knew nothing of the proper selection of a gravel suitable for the purpose—beyond his own limited experience.

The later development of extensive construction work has grown from surface tarring work. Engineers, noting the efficacy of surface tarring with prepared tars, naturally tried to produce more permanent results by using a larger quantity of refined tar on the surface of the road. In order to do this, it was necessary to use the tar while the surface of the road was still open. Roads constructed in this way oftentimes gave excellent results, but a modification was seen to be necessary in the refined tar use. A much heavier material gave better results, and, with the heavier material, it became possible to apply the tar in the earlier stages of construction of the road. To-day many miles of road have been built in which the tar binder has been placed on the second course of stone, and some even have been built in which the bituminous material has been applied to the lower course as well as to the upper course.

Great care is necessary in building roads by these penetration methods, since the road surface must be so prepared as to keep the refined tar at the point needed without letting it run into the bottom of the road, where it is not wanted. It is also very essential that the road be properly built; that good road materials be used; that the prepared tar be of the proper consistency; that the tar run uniform in quality, and that it be heated to the proper temperature before applying. Roads when properly constructed along these lines have given excellent satisfaction. The tar bitumen holds the stones in place, so that there is no internal wear in the road, and the stones themselves are held to a proper bearing to receive the traffic imposed upon them. English experiments have shown that, with moderately heavy traffic, a tar macadam will last 10 times as long as a water bound macadam.

Under favorable conditions, the cost of building a road by the penetration method is little, if any, above that required to build a road in the ordinary way. The time gained in the construction work, the lesser amount of stone and screenings required, and the less rolling needed, go far towards paying for the tar binder.

The perfecting of the penetration method lies in the development of more perfect means for applying the bituminous material to the different courses of stone in the construction of the road. In England the Aitken machine has been used for this purpose with very good results, and the Aitken machine, imported by the Barrett Manufacturing Company, of Boston, has also been used for the same purpose. Other types of machines have been tried in Boston, Worcester and Cleveland with some promise. The difficulty, however, in machine application is to join together the areas laid by two trips of the machine. Either a large overlap must be made or spaces will be skipped. For this reason hand work has proved the best up to the present time, and, when well done by skillful men, leaves little to be desired.

The difficulty in securing uniform results by the penetration method has led to taking up the mixing method again, although the method is much more expensive than the penetration method. The materials employed are, however, instead of the old tar, pitch and gravel mixtures, prepared tars and crushed stone. Good examples of mixing work have been laid in Massachusetts, at Hamilton and Walpole, Mass., by the Massachusetts Highway Commission. The costs, however, have been too high to permit of a universal adoption of the method, and the penetration method still remains the most favorable for a cheap tar bound macadam.

With the extensive construction of tar bound macadam, its care and maintenance have become problems to the engineer. In England—where road maintenance has been given more attention than in any other country—it has been found economy to repair the slightest defect in a tar bound macadam at once, and to give treatments to the surface occasionally with prepared tars. With such treatments, the life of a tar macadam road should be extremely long, and this solves in a satisfactory manner one of the road engineer's most aggravating problems—the construction of a moderate cost road to meet modern automobile traffic.

[Official Report.]

SECOND ANNUAL CONVENTION, PENNSYLVANIA GAS ASSOCIATION.

Held in Heptasoph Hall, Easton, Pa., April 13-15, 1910.

First Day—Morning Session.

The meeting was called to order at 10 A.M., Wednesday, April 13, by the President, Mr. E. G. Holzer, who introduced Mayor Henry McKeen, whose

Welcome to the Association

was hearty and brief. A reply to the welcome was appropriately made by Mr. B. F. Cresson, President of the Easton Gas and Electric Company. On motion of the latter a vote of thanks was tendered the Mayor for his presence and for his words of welcome.

Mr. Cresson hereupon informed the meeting of the serious illness of Secretary Merritt, and that at a meeting of the Executive Committee, Mr. W. O. Lawson was named as

Temporary Secretary.

The Secretary read the following telegram from Mr. Merritt:

Lebanon, Pa., April 13, 1910.

E. G. Holzer, President Pennsylvania Gas Association, Easton, Pa.

Best wishes for a successful and pleasant meeting. Sorry I cannot be with you.—F. H. Merritt.

A Fraternal Token.

On motion of Mr. Keppelman, the Secretary was instructed to send a message of sympathy to Mr. Merritt from the members of the Asso-

ciation expressive of their regret that illness prevented him from attending the sessions, the message to be accompanied by an appropriate floral token.

THE REPORT OF THE SECRETARY AND TREASURER,

as read by Mr. Lamson, showed a total receipt of $381.75 for the year, an expenditure of $45.78, and a balance of $325.18.

The following report from Council on

APPLICATIONS FOR MEMBERSHIP

was read by the Secretary:

Gentlemen—The following who have made application for membership in the Pennsylvania Gas Association, approved and passed by Council, April 12, 1910, but have not been elected, their applications having been entered after the meeting of April, 1909:

Active.

Bout, J. V., Easton.	Lincoln, L. V., Mauch Chunk.
Beedley, E., Bethlehem.	McPherson, T. F., Easton.
Cantron, G. V., Hazelton.	Mueller, P., Erie.
Chewning, W. L., Reading.	Mather, Jno. L., Wayne.
Coughlin, D. M., Easton.	Protheroe, T. J., Wilkes-Barre.
Davies, E. L., Allentown.	Perkins, M. F., Reading.
Dugan, F. P., Lewistown.	Stroud, M. W., Philadelphia.
Gotwals, C. G., Norristown.	Sweeney, H. E., Stroudsburg.
Kilmare, J. B, Conshohocken.	Sivson, M. T., Hazelton.

Associate.

Bartlett, C. E., Camden, N. J.	Macon, G. C., Jr., Easton.
Bailey, M. M., Royersford.	MacBeth, N., Gloucester, N. J.
Bugy, H. W., Lansdale.	Morrisson, C. E., Bethlehem.
Clifford, T. C., East Pittsburgh.	Nichols, C. B., Philadelphia.
Cruse, A. R., Ambler.	Peck, H. G., Philadelphia.
Crawford, G. W., Philadelphia.	Penewill, E. E., Philadelphia.
Dutton, B. H., Philadelphia.	Reiley, J., Harrisburgh.
Franklin, W. H., Philadelphia.	Thomas, R. H., Philadelphia.
Greene, F. C., Philadelphia.	Weadly, W. F., New York City.
Kane, W., Philadelphia.	Wardell, C. W., Gloucester, N. J.

ELECTION OF NEW MEMBERS.

On motion, the Secretary was instructed to cast the ballot of the Association in favor of the election to membership of the gentlemen named, and he subsequently reported that he had acted in accordance with the instructions.

A TELEGRAM.

The Secretary read the following:

NEW YORK CITY, April 12, 1910.

Penna. Gas Association—Regret my inability to attend the meeting, and hope you will have a profitable and successful convention.—H. L. DOHERTY.

AMENDING THE BY-LAWS.

On motion of Mr. Keppleman, on behalf of the Committee on Amendment to By-Laws, reported that it was deemed advisable to make a change in the by-laws, so as to provide admission to membership for residents of the contiguous States to Pennsylvania, embracing New Jersey, Delaware, Maryland, Ohio and New York. [The vote was unanimous.]

The President appointed the following as a

COMMITTEE ON NOMINATIONS.

Messrs. J. A. Frick, R. M. Wilson and T. Floyd McPherson; and as a

COMMITTEE ON NEXT PLACE OF MEETING,

Messrs. H. D. Gillingham, W. R. Rhoads and G. B. Bains.

President Holzer then read the following

ANNUAL ADDRESS.

Gentlemen, I am very much gratified to see so large a body of representative gas men, and take great pleasure in welcoming you to this, the second annual convention of the Pennsylvania Gas Association, in our beautiful "City of Resources," and trust while here you will profit by every opportunity to see the different places of interest. You will find a hearty welcome awaiting you at the gas and electric plants and offices of the local Company.

We are all very much indebted to Mr. B. F. Cresson, Chairman, and his Committee on Arrangements for this meeting, for their labors in our behalf, and I believe you will, at the end of these sessions, be ready to give that Committee a vote of thanks for the programme they have mapped out.

I will also state our Committees on Membership and on Papers have been active and successful, and feel that our Association in the near future will be recognized as one of the best of State Associations.

As I understand, it is the duty of your President to address you upon such topics as to his mind may most profitably engage your attention as an Association, and having discharged his duty in this particular, it becomes the duty of the Association to adopt or reject his recommendations as in its wisdom it may deem most advantageous to itself. The chief function of this Association is educational. It is through the formal papers and their discussions that most good is done. The character of the papers about to be presented for your consideration is of a high standard, and I trust the discussions will be general. The men who discuss the papers as a rule are few in number. A writer of a paper, preparing it at his comparative leisure, with his books and records at hand, can cover the part of the general field of our industry that he has selected for his subject, and the sense of responsibility that comes from his position as a paper writer, as well as a desire to add to or maintain his own reputation, insures a serious attempt at thoroughness.

The interest of truth demands a thorough discussion of every paper, and a thorough discussion cannot be had unless a great number of discussers participate. The discusser has not the sense of responsibility, nor the stimulus of personal interest in the same degree as the paper writer. Ordinarily, he comments on a portion of the paper, and superficially; therefore, to bring out all the good points in a paper, a large number of discussers is required. In discussing the educational function, I would ask what efforts are the individual members of the Association making towards giving systematic aid to the many boys and men, who, without the advantage of an advanced education, are struggling to fit themselves for positions of responsibility while filling subordinate positions in our gas works.

If you will permit me to digress for a moment, I beg to say, your President has the honor of being connected with a company thoroughly in favor of Associations of this class, as well as local clubs or educational classes at each and every one of their many plants. They believe in the gathering together of the men in their different departments for social intercourse and educational discussions on the problems pertaining to gas manufacturing and distribution. They assist and encourage such meetings in many ways; occasionally with their presence. They have been exceptionally successful in all their undertakings, and I believe attribute a part of their success to the harmony and co-operative feeling existing among their employees, to encourage which each department holds regular meetings at stated intervals.

At the sessions of these department meetings, matters pertaining to that department are brought up for discourse and suggestions are offered for the betterment of the service and the general improvement of the methods employed.

In addition to the above there is formed a social and educational club, on the rolls of which will be found the names of every male employee of the Company. This club is provided with a nice room furnished with chairs and tables, and carries most of the latest gas literature.

Twice each month regular meetings are held, papers are read and discussed, occasionally prizes are offered for the best paper, plan or specification, on some certain line of work, and frequently points of great interest and benefit to the Company are obtained.

Gentlemen, the successful development of any gas operation or association depends on the harmonious, united efforts of each individual connected therewith. In what better plan can you secure this than through some such as I have above outlined? Remember, the boys forming these local clubs are the future prospects of our State and National Associations. I shall not go further into details along this line, as I believe that one of the papers coming before you will cover many points that I have not touched upon.

A great many here present are members of the National Association, or American Gas Institute, some of whom feel that in recent years the meetings have been of such a nature that the little fellow had no show, that it was governed principally by a certain few of the larger companies, who provided men with papers of a technical nature, and on subjects not at all benefitting to the man in the smaller sized works. In a recent address by the President of that Institute, he announced that in 12 years 50 per cent. of the papers contributed had been written by representatives of two powerful interests. In my estimation the Institute is to be congratulated on holding the interest of the larger companies to so great an extent as to have their employees write us 50 per cent. of the papers.

I have yet to learn that the representative of the smaller plant has been barred out, and evidently if the larger concerns had not taken sufficient interest to provide these papers, our meetings in that Association would have been less interesting, and the only remedy I can see for the little fellow is for him to come forward with his contribu-

tions and help swell the list of papers on his side. I can see no reason why he should lose interest, sit back and do nothing, but rather feel he should get down to business and write something or do something to assist in making the meeting interesting to all. I throw out these suggestions in view of the fact I have heard a number of remarks on this subject. I trust and hope this so-called little fellow will make himself very conspicuous at these sessions. I also trust that some of the larger interests will be sufficiently interested in our welfare to provide a few good papers occasionally for the edification of this Association.

We are now entering an era of prosperity, reports from all parts of the State indicating an increase of gas sales of 15 to 25 per cent. over last year. This state of affairs is not only local, but appears to be general throughout the country. Our manufacturers are overrun with orders for fuel and lighting appliances. Shipments are slow, and a great number of firms are enlarging their plants to enable them to meet the demands. In many instances, gas properties are increasing their manufacturing capacity and in other ways making ready to meet the demands of the coming fuel season. I believe we will all experience a prosperous season and recommend that you see to it that all parts of your plants are in proper condition.

Fuel season! Gentlemen, why should there be any special time of the year designated as fuel season? The time is rapidly approaching when the fuel season will comprise the 12 months of the year; in other words, with the help of our new business department, as being formed by all gas enterprises both large and small, the people of all classes are rapidly being taught the superiority, economy and convenience of gas over all other forms of fuel for year-round use.

The all-gas kitchen is doing much to bring this about. I trust that one of the papers coming before this meeting will bring out a general discussion on the subject; therefore, I will not go further into details along this line. I will also refrain from touching on new business methods as a more capable writer will bring the subject before you.

A very important feature to which I wish to call your attention is the failure of this Association to provide a Question Box. In all other meetings of this character the Question Box has been an important factor. I recommend a committee be appointed to take this in hand. I also recommend a committee be appointed to decide upon an appropriate badge or button symbolizing the gas fraternity of the Keystone State.

One word in closing in reference to our Association. All credit is due your first Vice-President, Mr. Keppleman, for its existence. He first expressed his ideas on the subject, on the boat *en route* to West Point, October, a year ago, the occasion being the American Gas Institute excursion from New York. On the boat a dozen Pennsylvania gas men promised to meet in Reading the following month, at which meeting the subject was thoroughly discussed and organization agreed upon and committees appointed to draft a constitution and by-laws. The organization meeting took place in Reading, December 2, 1908, with less than 20 members. The first annual meeting took place in Harrisburg, April, 1909, with 60 members present. At this date there are close to 100 members on the roll, with many more prospects in view. I regret to say there has thus far been few applicants from the western part of our State. Although we have applicants from Maryland and West Virginia, I trust, ere another year rolls around, our western brothers will wake up to the fact that Pennsylvania has a live Gas Association, which extends to them a cordial invitation to join its ranks and assist in a promotion and advancement of knowledge, scientific and practical, in all matters relating to the construction and management of gas works and the manufacture, distribution and consumption of gas.

I thank you, gentlemen, for your kind attention and the honor of this position.

Appointment of Committee on President's Address.

On motion of Mr. Ganser, seconded by Mr. Keppleman, the address of the President was accepted and the following committee appointed to report on the suggestions made therein: Messrs. W. R. Rhoades, C. W. Butterworth and H. H. Ganser.

The President here introduced Mr. B. F. Cresson, of Easton, who read the following paper on the

QUALIFICATIONS FOR A SUCCESSFUL MANAGER OF A BUSINESS CORPORATION.

I have been asked to say something about the qualifications necessary for a man to possess to cause him to be successful in managing a public service corporation, and with such a request I deem myself fortunate in having had the opportunity of seeing the work of managers of such business in many situations during the past few years, of observing methods and results, and so feel it possible for me to form a composite manager in my mind, possessing the good, and eliminating the poor qualities; for an ideal manager is not frequently seen in the flesh. It is a position requiring such a varied equipment that a rare man is called for.

First of all, the manager should be able to thoroughly manage himself, to be able to meet the problems coming up, some of which may be exasperating, without losing control of himself and exhausting tissue in losing temper instead of utilizing all his power. He should possess tact to handle the unreasonable, as well as the reasonable client, and be as approachable to one as to the other, and with this to maintain the dignity of his position. While always ready to criticize and insist upon work of all kinds being properly done, he should also mete out appreciation for good efforts, and extend encouragement, which I believe quite as important.

He should be able to conduct the business of his company so as to gain and hold the goodwill of his community, keeping his company always on a high level and commanding respect.

He should at all times present a cheerful front, impressing everyone with a feeling that all goes well with him and his company. Be enthusiastic, and inspire his people with enthusiasm, and appear to be an optimist, however he may feel; and it is certain there will be some depressing moments in his life.

He should be a hard worker, his chief aim in life being the good of his company, and to so plan his work, and that of his associates, that, while getting best results, he should be able to enjoy his work and his life himself, and enable his people to enjoy theirs. A little touch of sentiment should go along with earnest work.

He should be a good talker, able to adapt himself to all sorts and conditions of men and women, and a good mixer; approachable, and willing to meet and greet all sorts.

He should know all the details of his business, but should not devote too much of his time to detail, that his mind will be clear to take, and keep a general view of his situation; and so good a judge of men that he can gather around him assistants capable of handling each position and place responsibility upon them.

He should be able to systematize, and insist upon system being carried out to the smallest detail of the business, and be a disciplinarian, maintaining the dignity of his position, compelling the respect and regard of his associates. Co-operation should be his watchword, for without it and good team work, best results cannot be had. To this end he should gather his people together frequently to discuss matters of business, receive and convey ideas, endeavor to have his views as to new methods, and changes in methods, carried out by suggestion, rather than by dictation, and inspire his business family with loyalty to himself and his company.

He should be the balance wheel of his machine, able to keep things steady and hold back as well as push forward, have foresight and be able to anticipate coming conditions with patience to await proper time for action. He should be a peacemaker and handle differences as they arise among his people, so as to reach an adjustment which will be recognized as fair and leave no hard feeling behind. He should keep fully abreast, or a little ahead of the progress in his profession, assimilating new ideas which may come from literature or discussion. He should be in good terms with the newspaper people of his community, prevent unfair criticism and get all the advertising possible. He should take a lively interest in municipal affairs and aid every effort for the development of his town. He should not take an active part in politics, but keep on good terms with all parties. He should feel that the interests in his charge are as his own interests, and give the same, careful, honest, whole-souled attention to them as to his own, and he should endeavor to make every employee of the company feel a personal interest in it, and a pride in being connected with it, ready at all times and everywhere to speak a good word for it.

He must be able to inspire his principals with confidence in his ability and fitness for his position, and earnest efforts in their behalf; this, of course, by results. With these qualities, and with the ability to do these things, he should be a successful "Manager of a Public Service Corporation."

Discussion.

The President invited discussion on Mr. Cresson's paper.

Mr. Ganser—I think this is a creditable paper that contains much good advice for all gas managers, although it will take quite an

effort to live up to all parts of it. I know that Mr. Cresson does not expect us to. This paragraph is especially valuable: "He should be on good terms with the newspaper people of his commnnity, prevent unfair criticism and get all advertising possible. He should take a lively interest in municipal affairs and aid every effort for the development of his town. He should not take an active part in politics, but keep on good terms with all parties." I want to say right here that I have been following that policy to the letter. From theday I began in the gas business one of the first moves was to make the acquaintance of all the newspaper men in the community. Another thing I never do is to "knock" those in charge of the municipal affairs of the town. "Boost," don't "knock." If you haven't a Board of Trade, form one. I tell you the gas company is in a position to do much for the success of any Chamber of Commerce, Board of Trade or any business men's association that may be formed. I think every man here should read that paragraph over again and follow the advice there given.

Mr. Gillingham—I feel that the specifications set forth by Mr. Cresson for a successful manager are of a very high standard, and while it is applicable to gas managers I think it should be applicable to every employee in a gas company, and it would be a good thing for a company to have its men read this paper and try in their own way to live up to the points brought out.

Mr. Lamson—Ever since I have been in the gas business I have tried to find some standard set of rules to govern the management of a gas company; and I want to say, when I read Mr. Ganser's paper, it came nearer to my idea of a standard than anything else I ever encountered. It touches a great many points that we should bear in mind in our everyday work, and it applies to every other man in the company's service as well as to the manager.

Mr. Davis—This might not interest some of the managers who are here from the large cities, but in my home the company has practically been the making of the Board of Trade, and is very active in boosting the city. In every "ad." we use in the home papers we boost for Chester, and I believe this sort of thing has brought the people into the confidence of the Company.

On motion of Mr. Butterworth, seconded by Mr. Lamson, a vote of thanks was awarded to Mr. Cresson for his paper. The

REPORT OF THE NOMINATING COMMITTEE,

which was then submitted, recommended the following named gentlemen as its choice for office bearers during the ensuing year:

For President—J. H. Keppleman, Reading.
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On motion of Mr. Gillingham, seconded by Mr. Dugan, the report was accepted and its recommendations agreed to.

SOME RESPONSES.

Mr. Keppleman (the President-elect)—Mr. President and Gentlemen of the Association: I feel honored in having been elected President of this Association for the year 1911, but had hoped that the Association would decide upon some better man. I did not know where our next meeting was to be held, but I had no doubt your committee would name Reading. I want to say to you that the hospitality of Reading is known wherever the town is known and that you will be welcome there. The chief trouble at Reading at this particular time is that we cannot accommodate you all one hotel. We have not the room, but we hope that, in 1912, which will be the year following, we will have a very fine, up-to-date hotel, where we might be able to accommodate the whole body. As the Association has decided to name me I have nothing else to do but to give you my thanks, coupled with the assurance that I will do everything I possibly can to advance the interests of the Association.

Mr. Butterworth—Mr. President, I thank the members very much, and I wish to say that I will do everything I can to advance the interests of this Association.

Mr. Ganser—Mr. President and Gentlemen: I feel honored, I have been very enthusiastic from the start and I promise that I will do everything in my power to the end that some day we will be able to assert that the Pennsylvania Gas Association will be the most flourishing Association in this State.

On motion, an adjournment was ordered.

FIRST DAY—AFTERNOON SESSION.

On reconvening Mr. Gillingham, from the Committee appointed to name

NEXT PLACE OF MEETING,

reported that the Committee favored Reading. The report was concurred in.

The President called upon Mr. W. T. Brown to read (in the absence of the author, Mr. George W. Thompson, of Chester, Pa.) the following paper on

COMMERCIAL TOPICS.

The real good of this meeting is going to be had from the interchanging of ideas in social chats and discussing the papers presented here, so the value of my paper is not in what I have written, but in the good points to be brought out during the discussion. The combination makes the value of the paper.

First, I think we all agree that an active campaign for doubling our gas sales, on both old and new appliances, is the right thing to do, in fact, it is the only thing to do; but *how* can we do it? I claim the start could be made in the training of our men, not only the new business representatives but employees from all departments. This, aside from the personal development of the men, insures co-operation and not friction, as sometimes exists.

The new business department of our Company holds a meeting every Monday evening, from 7:30 until 10, which is open to all employees. The first half-hour is devoted to general new business topics. The next 1½ hours is devoted to studying salesmanship from a definite working plan, and there is energetic push back of the plan. The last half is devoted to experiences of the past week; each man must rise and take a part. These meetings are only one of the several ways we have of trying to build up loyalty and enthusiasm among the men upon which so much depends.

On the second Thursday evening of each month we hold our regular employees' association meeting. After the regular business is transacted we read and discuss the articles appearing in the gas and electric trade journals.

At present they are working on rules for distribution employees, compiled by Mr. Robb for the Ohio Gas Light Association. This Association pays sick benefits. Full details can be had by writing our Secretary.

On the fourth Thursday evening of each month they hold demonstration meetings. From the list of different uses for gas, of which you are all familiar, each appliance is taken up in order and demonstrated. When the appliance is not in stock a general description is given, which takes in the cost of operating. Ranges, water heaters, lights, blast appliances, etc., are tested for efficiency under actual working conditions.

Try to inspire into your men the fact that they have a marvelous opportunity, limited only by their ability. Have each one of them take part in the meetings; get them on their feet during the discussions; let them take their turn in the demonstration of some appliance; have them look up and study catalogues.

Bulletins of the meetings are gotten out by the department stenographer, consolidating all matters into one bulletin. Notes are made in the bulletin of items of interest occurring at any of our neighboring companies. The bulletins are posted in offices, storeroom and works of our Company. A file is used for this purpose which enables the employees to refer back on looking up former questions. The scheme of posting the bulletins where convenient offers to the boys very interesting subjects for noonday discussions. It aids the shop men; the men in turn aid us. We must have this team work or co-operation, as it is absolutely essential to progress. The leader of these employees' meetings must be impressed with the fact that, in order to boost our business, he should be enthusiastic; for that reason he should bear in mind water can rise no higher than its source; as with water, so with enthusiasm.

I think I am fair in saying that you men here to-day are not going to be satisfied with the past business if better be possible. I say that you can do better. Now, this may seem like a dream, gentlemen; but it is the truth, let me tell you. For instance, are the boys making good in your business? Are they selling all the gas they should in a territoay the size of theirs? If not, have they carefully thought out the reason? What means do they take to let the public know that they have appliances to sell and that they can supply their needs in heating, cooking, lighting, industrial and power appliances? Do they skimp their work, quit on the second and always begin 5 minutes too late? Do they put their best thought and endeavor in the task before

them? Is their heart in the work they do, or do they simply toil for the sake of getting some money? Are they making any effort to save something from their salary, or are they in debt to other employees of the Company? Is their standing socially in their districts what it should be? Are they taking part in the movements conducted by the people for the betterment of their districts or city at large? Again, are they making good?

Now, as you all know, there is a certain population in your districts; let's say 50,000. Taking five people to a house would make 10,000 houses. This means that 50,000 people have to be fed, and they have to see during the dark hours of the year. It also means that, in order to get this light and heat, 10,000 houses must be supplied with all necessary cooking and water heating appliances and the gas lighting fixtures.

Now, the first chapter in your new business book is not so much as what these 50,000 people are going to do about getting the needed equipment; but what are we, as gas men, going to do? Personally, I believe, just as firmly as I believe the sun sets, that there is no better commodity known to-day to do this cooking and lighting than gas; and now, gentlemen, do your men know this? Have they the confidence in the business they should have? This confidence they must have, both in the fact that gas is unequalled and in their ability to prove it. Right here, let me tell you that it is the employees, the employees in all departments, who go out and meet the people. The people do not do business with the company, but with the individual members of the company.

Now, suppose it be a fact that the district each of us represents is fairly well worked, or you have connected on your mains a large percentage of the houses. That does not mean they are using gas alone for the lighting and cooking, but only use it as they think profitable to them; notice, I say, as they think. The reason of the small sales is the lack of proper education. We should teach them to extend the use of our product to replace all other light and fuel. There are so many people who would burn more gas if we would but prove to them the economy of its use. I happen to know this to be a fact, on account of my visiting every house of any note in my own Company's territory. I actually did the work for several years. This education can best be done by a systematic house-to-house canvass, with the aid of proper advertising. The time I believe has come for us to throw over the old idea that, in order to increase our sales, we must work only for new appliances. I believe the larger part of the small number who have not already got the necessary first, or starting appliances, are not worth the cost to get them. There are those for whom you would have to run services, set meters, run stove lines, etc., meaning more investment, and the gas sales on said investment would not pay 1 per cent. They would hold down your sales per meter, also your per capita sales. I think a fair comparison can be better made by sales per $1 bank deposits, for the reason that, while you are devoting your time and money on the doubtful, your real prospects are being neglected. Always remember that big gas appliance sales and a ledger full of unpaid bills, which means hundreds of idle services, do not show on your reports as good business, but just the reverse. It shows that in many of these cases one of our men was too anxious to make sales. He cost the Company many dollars for which there was no return. Believe me, this kind of a man is a liability, not an asset.

Again I say, it is gas that we want to sell, and it is gas the people want in greater quantities, if they only knew it. Let us save a few cents per 1,000 by not adding on any more of this unprofitable business in the future, and spend the money in the building of our present business. If we would study the policy adopted by the companies at Grand Rapids and Detroit, Mich., I mean study it, not just read about it as we usually do, but get the inspiration from them and put it in our own company, it would not lead us wrong.

Just another point about our men and I am through. While I dislike very much to openly knock another fellow's system of running his business, not all, because I scarcely regard myself in the same class that some of you belong, nevertheless, as it is called for, I will proceed here to give you the benefit of my objections and suggestions, and you can take them for what they are worth.

In the first place I take exception to the name solicitor. We are not, in the true sense, solicitors, but rather representatives, who represent the company in the matter of all sales, and the adjustment of high bills, many times acting as a trouble man, demonstrator, etc. In reality they are boosters and solicitors. I also take exception to the word new business department. It is misleading to our present and prospective customers. It leads them to believe, after you sold them, their future requests would go by the board or be referred to some old business department. Let your people know that you are the commercial department, which not only adopts methods to get them, but also adopts methods to hold them satisfied.

Second.—That we do not bestow the confidence on our men we should. The presidents, general managers and all officers could, by meeting and talking to the employees at some of their regular employees' meetings, arouse all the men to the point of greater loyalty and enthusiasm. As it is to-day many men do not know the officers of the company for whom they work, only by name, and some of the new men when starting in are never made acquainted with the heads of other departments with whom they will have to depend for the carrying out of their sales, orders, etc. Success lies in the united, intelligent effort of the whole company, not alone on any one man or department; for that reason, have co operative meetings.

Third.—To help secure this united, intelligent effort in the commercial department, we must let our men know what they cost the department and the amount of revenue they secure. Read your monthly reports at their meetings. Let them know the average cost to run an outlet, set a gas range, connect water heater, furnace connection, maintain lights, etc. Read your gas sendout report; show the comparison in different districts for the year with gain over last year. I find, by making our men acquainted with the commercial department reports, etc., they are able to work more intelligently (I have a few samples of our reports, should anyone want to see them).

Fourth.—I do not like the way some of the companies have antagonized the plumbers. We ought always remember that they should be one of us.

Preparation is the bait for expected increase. For that reason, plans should be laid in advance, and I would suggest that you have each of your men prepare a plan for the season's work on the following:

New buildings, news articles of sales, inspection of industrial appliances, teaching cooks the work of a demonstrator, oyster cookers, industrial and hotel prospects, street lighting, water heaters, house-to-house canvass, gas kitchens, public school kitchens, gas engines, advertising, etc.

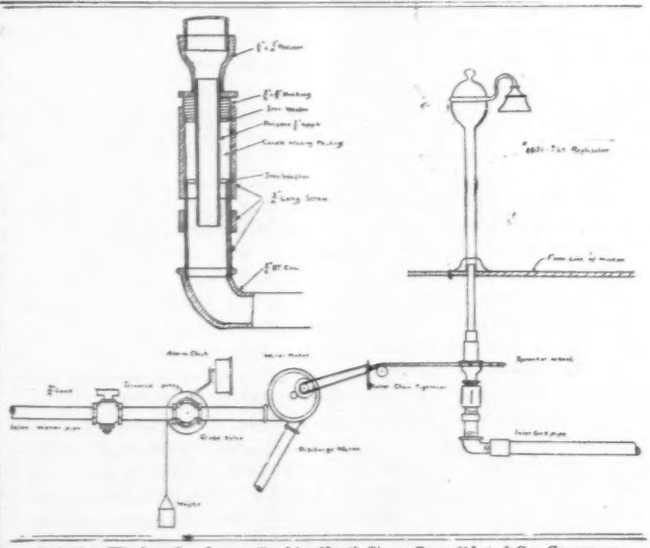
I hope I have said enough to invite a good, live discussion.

(To be Continued.)

Description of Window Display.

[Described by Mr. F. S. Armstrong at the Sixth Meeting, Illinois Gas Association.]

The North Shore Consolidated Gas Company offers a novel window display in the form of rotating window gas lights. The device was designed and made by Mr. Otto W. Bockeloh who is in its employ. It is very simple in construction. A Charrington water-motor is used for power and is fed by a ¾-inch pipe. As shown in the illustration a wooden wheel is attached to the stem of a globe valve con-



Rotating Window Gas Lamp, Used by North Shore Consolidated Gas Company.

trolling the flow of water. A stout cord is attached to the wheel and to this cord a weight is tied. An ordinary alarm clock, in turn, is

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Now, as you all know, there is a certain population in your districts; let's say 50,000. Taking five people to a house would make 10,000 houses. This means that 50,000 people have to be fed, and they have to see during the dark hours of the year. It also means that, in order to get this light and heat, 10,000 houses must be supplied with all necessary cooking and water heating appliances and the gas lighting fixtures.

Now, the first chapter in your new business book is not so much as what these 50,000 people are going to do about getting the needed equipment; but what are we, as gas men, going to do? Personally, I believe, just as firmly as I believe the sun sets, that there is no better commodity known to-day to do this cooking and lighting than gas; and now, gentlemen, do your men know this? Have they the confidence in the business they should have? This confidence they must have, both in the fact that gas is unequalled and in their ability to prove it. Right here, let me tell you that it is the employees, the employees in all departments, who go out and meet the people. The people do not do business with the company, but with the individual members of the company.

Now, suppose it be a fact that the district each of us represents is fairly well worked, or you have connected on your mains a large percentage of the houses. That does not mean they are using gas alone for the lighting and cooking, but only use it as they think profitable to them; notice, I say, as they think. The reason of the small sales is the lack of proper education. We should teach them to extend the use of our product to replace all other light and fuel. There are so many people who would burn more gas if we would but prove to them the economy of its use. I happen to know this to be a fact, on account of my visiting every house of any note in my own Company's territory. I actually did the work for several years. This education can best be done by a systematic house-to-house canvass, with the aid of proper advertising. The time I believe has come for us to throw over the old idea that, in order to increase our sales, we must work only for new appliances. I believe the larger part of the small number who have not already got the necessary first, or starting appliances, are not worth the cost to get them. There are those for whom you would have to run services, set meters, run stove lines, etc., meaning more investment, and the gas sales on said investment would not pay 1 per cent. They would hold down your sales per meter, also your per capita sales. I think a fair comparison can be better made by sales per $1 bank deposits, for the reason that, while you are devoting your time and money on the doubtful, your real prospects are being neglected. Always remember that big gas appliance sales and a ledger full of unpaid bills, which means hundreds of idle services, do not show on your reports as good business, but just the reverse. It shows that in many of these cases one of our men was too anxious to make sales. He cost the Company many dollars for which there was no return. Believe me, this kind of a man is a liability, not an asset.

Again I say, it is gas that we want to sell, and it is gas the people want in greater quantities, if they only knew it. Let us save a few cents per 1,000 by not adding on any more of this unprofitable business in the future, and spend the money in the building of our present business. If we would study the policy adopted by the companies at Grand Rapids and Detroit, Mich., I mean study it, not just read about it as we usually do, but get the inspiration from them and put it in our own company, it would not lead us wrong.

Just another point about our men and I am through. While I dislike very much to openly knock another fellow's system of running his business, not all, because I scarcely regard myself in the same class that some of you belong, nevertheless, as it is called for, I will proceed here to give you the benefit of my objections and suggestions, and you can take them for what they are worth.

In the first place I take exception to the name solicitor. We are not, in the true sense, solicitors, but rather representatives, who represent the company in the matter of all sales, and the adjustment of high bills, many times acting as a trouble man, demonstrator, etc. In reality they are boosters and solicitors. I also take exception to the word new business department. It is misleading to our present and prospective customers. It leads them to believe, after you sold them, their future requests would go by the board or be referred to some old business department. Let your people know that you are the commercial department, which not only adopts methods to get them, but also adopts methods to hold them satisfied.

Second.—That we do not bestow the confidence on our men we should. The presidents, general managers and all officers could, by meeting and talking to the employees at some of their regular employees' meetings, arouse all the men to the point of greater loyalty and enthusiasm. As it is to-day many men do not know the officers of the company for whom they work, only by name, and some of the new men when starting in are never made acquainted with the heads of other departments with whom they will have to depend for the carrying out of their sales, orders, etc. Success lies in the united, intelligent effort of the whole company, not alone on any one man or department; for that reason, have co operative meetings.

Third.—To help secure this united, intelligent effort in the commercial department, we must let our men know what they cost the department and the amount of revenue they secure. Read your monthly reports at their meetings. Let them know the average cost to run an outlet, set a gas range, connect water heater, furnace connection, maintain lights, etc. Read your gas sendout report; show the comparison in different districts for the year with gain over last year. I find, by making our men acquainted with the commercial department reports, etc., they are able to work more intelligently (I have a few samples of our reports, should anyone want to see them).

Fourth.—I do not like the way some of the companies have antagonized the plumbers. We ought always remember that they should be one of us.

Preparation is the bait for expected increase. For that reason, plans should be laid in advance, and I would suggest that you have each of your men prepare a plan for the season's work on the following:

New buildings, news articles of sales, inspection of industrial appliances, teaching cooks the work of a demonstrator, oyster cookers, industrial and hotel prospects, street lighting, water heaters, house-to-house canvass, gas kitchens, public school kitchens, gas engines, advertising, etc.

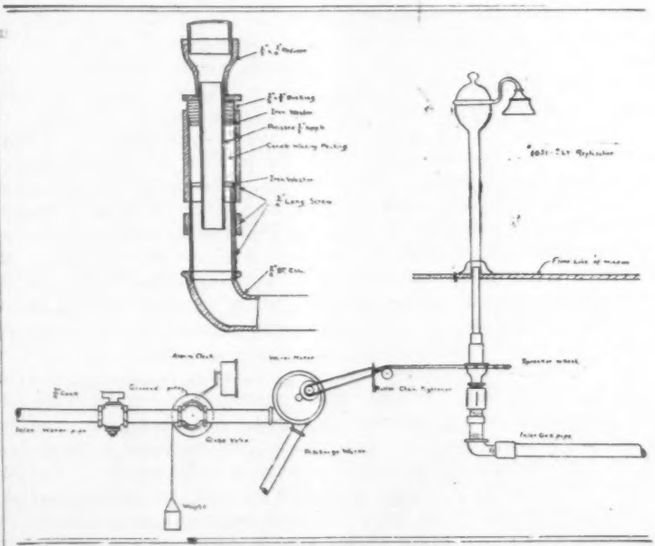
I hope I have said enough to invite a good, live discussion.

(To be Continued.)

Description of Window Display.

[Described by Mr. F. S. Armstrong at the Sixth Meeting, Illinois Gas Association.]

The North Shore Consolidated Gas Company offers a novel window display in the form of rotating window gas lights. The device was designed and made by Mr. Otto W. Bockeloh who is in its employ. It is very simple in construction. A Charrington water-motor is used for power and is fed by a ¾-inch pipe. As shown in the illustration a wooden wheel is attached to the stem of a globe valve con-



Rotating Window Gas Lamp, Used by North Shore Consolidated Gas Company.

trolling the flow of water. A stout cord is attached to the wheel and to this cord a weight is tied. An ordinary alarm clock, in turn, is

hooked to the wheel so that, when the alarm goes off, the water is shut off instantly. The connection from the motor to the stem of the fixture is made by using the sprocket wheel, the gear wheel and the chain of a bicycle, the chain being preferable to a belt on account of the tendency of the belt to stretch or slip. This device is operated at 16 revolutions per minute, though greater speed may be had if desired. The ratio of the two wheels is one to four.

For the rotating fixture itself, he has used a No. 1,031 3-light reflexolier, turning this upside down, if we may use this term. The fixture is connected to the regular pipes supplying the window, which also is operated by the clock. It might be of interest to add that this device has been in the Lake Forest office for about 3 weeks and has occasioned no little interest. The continual changing of the glassware always offers something new to the eye. A mirror placed just back of the lights facing the street adds a great deal to the effect.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

955,308. Gas Burner. C. L. Bean, Cincinnati, O., assignor to J. C. Diefenbach, same place.

955,361. Means for Packing Incandescent Mantles. H. Schmalland, Berlin, Germany, assignor to Deutsche Gasluhlicht Aktien Gesellschaft, Berlin, Germany.

955,549. Gas Lamp. A. Rector, New York City, assignor, by mesne assignments, to Rector Gas Lamp Company, same place.

955,585. Gas Generating Apparatus. H. H. Eason, Chicago, Ills., assignor to Acorn Brass Manufacturing Company, same place.

955,614. Gas Producer. G. C. Stone, New York City, and R. H. Dodd, Palmerton, Pa.

955,651. Gas Cleaner. P. Meehan, Lowellville, O.

955,825. Lock for Prepayment Meters and Similar Devices. H. H. Newman, Paterson, and J. J. Ferrick, Passaic, N. J.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, April 9th, 1910.

Gas Works Extensions at Paris.—The Sales of Gas Act, 1859.

The history of the gas supply in the city of Paris is an instructive one. The locality is not the most favorable for manufacture of cheap gas, but the hindrances to development are rather to be traced to financial management than to local prices of coal and labor. The Gas Company only had a limited concession which expired in 1902. So, under the conditions which prevailed before that date, there was little if any inducement to sell cheap gas. The Company had a heavy tax to pay to the municipality and no inducement for laying out capital. In fact, the arrangement was an ideal one for keeping up the price and for starving the works. The only object in view was to make money, and a modern gas undertaking, while not expecting to run on purely philanthropical lines, takes a broader view of its responsibilities, knowing that it is dependent for anything like a prosperous existence on the goodwill that can only be secured by a reasonably cheap and efficient service. Up to 1902 the price of gas was equivalent to 6s. 9d. per 1,000 cubic feet. It is really sold by the "metre," but for convenience the price may be stated in the terms usual in England and America. In that year the consumption was just over 10,000 million cubic feet and there were 455,000 consumers. In 1902 the municipality took over the undertaking and reduced the price to 4s. 6d.—not a cheap price, but still a marked reduction as compared with the old rate. The result was evident by a large increase in the number of consumers and in the quantity of gas consumed. Several of the suburbs took over the portion of the gas mains within their districts and supplied their own gas, reducing the municipal consumption to a corresponding extent. But, notwithstanding the loss due to that cause, the consumption had increased to 14,438 million cubic feet and the number of consumers to 630,104, at the end of 1909. With a steady increase of about 5 per cent. each year a point has now been reached when the whole plant requires substantial enlargement, with a view to the probabilities of the future.

The question as to the permanence of the gas industry appears to be well settled in the French capital, as the Prefect of the Seine has approved a reconstruction and extension scheme that will involve an outlay of over seven millions sterling, and take 10 years to carry out. Two existing stations are to be enlarged, an entirely new works is to be put down, and some half dozen existing stations, situated in crowded localities where there is no room for extensions, and also where land is valuable, are to be closed. Tar works, chemical works and a firebrick manufactory form a part of the scheme. The works to be closed are not only small, but old-fashioned, and, therefore, apart from the advantages of centralization, their demolition affords opportunities for the introduction of the best and latest modern improvements. And it is quite evident from the report that the engineers who have the matter in hand have not overlooked all that is being done in other countries. In following the example of other principal cities in the world, that have recently reconstructed their gas works, the Paris Municipal Council may be expected to furnish interesting examples in the way of large installations of innovations such as vertical retorts, naphthaline extractors, or high pressure distribution.

Considerable attention has lately been directed to the "Sales of Gas Act, 1859," which governs the legal testing of the accurate registration of gas meters. It is an antiquated remnant of the days of the fish tail burner, when gas companies were supposed to supply a minimum pressure at the inlet of the consumers' meters of 6-tenths by day and 8 at night. And even at the time when it first saw the light, it was the subject of criticism and was shown to be incomplete. On the whole it was known to be drawn in the consumers' favor. By common consent the consumer is entitled to the turn of the scale and it is certain that from the average gas meter he gets a resounding bump to the tune of 1 or 2 per cent. If the tendency had been the other way about, the Act would have been modified or extended 50 years ago. As it is, the gas companies have not cared to move in the matter, and no other members of the public, either individually or collectively, have any inducement to do so. The slot meter, which has gradually worked into a very prominent position in connection with the supply of gas, does not figure at all on the law books of the country. Certainly one-fifth, and probably one-fourth of the total quantity of gas metered in the United Kingdom, is cared for by a meter of the automatic type. And yet one rarely hears of a dispute about the registration of a slot meter. It is remarkable that a new system of buying and selling should have developed to such a large extent without the necessity for legislative interference or regulation becoming evident or acute. An advantage of the slot system is that any defects in registration become evident immediately. If the quantity of gas delivered per coin inserted does not come up to the full expectation, the gas complaint office is promptly called upon to change the meter. And with a properly worked system of clearing the cash boxes every month or 6 weeks, any shortage of cash is promptly detected and inquired into. A dry meter frequently slows down, and takes the process very leisurely, and under some circumstances the fault is not evident until it finishes up by coming to a full stop. And even this conclusion of a long course of dishonesty may not be detected for a month or two. More than once the suggestion has been put forward that the index of ordinary meters should be made up and checked more frequently than once a quarter, and some few undertakings actually take an interim or mid-quarterly inspection. The experiences gained by the monthly or mid-quarterly reading of the slot meters certainly supports the correctness of this view.

The existing enactment carries on the face of it certain defects of a general character, that are not affected by changing conditions of gas supply. A gas meter comprises two essential but independent parts. These are the measuring chambers and the counting machine that records the number of movements. If one of these parts is wrong it does not help matters if the other is right. And yet the Act only recognizes one part—the measuring chambers. It takes no account of the counting, and by a simple mistake in connecting up the gearing the counting may be defective to the extent of tenfold or one hundredfold either way. It is on record that a meter with a defective counter—one of the pinion wheels had been left out, or else a superfluous one put in—and that, therefore, registered 10 times too fast, was in use in London for years. And the meter must have been stamped and passed as correct in accordance with the terms of the Act. It is remarkable that out of the millions of meters that are turned out every year so little trouble has arisen from this cause, and evidently the makers have practically remedied this defect in the Act by some strict system of inspection and perhaps testing. So I do not say there is any special need in practice for the accuracy of the counters to be checked, but it is not the business of the law to take

things for granted, and a seal that certifies the meter as accurate should only be offered after a complete test, and not on the authority of a partial one.

But the chief objection is the pressure at which the legal test is taken, which is 5-tenths of an inch of water, and the distrust is based on a very general doubt in the minds of gas engineers as to whether a test taken under these conditions gives anything like an indication of the behavior under ordinary working pressures, which will not be less than 20 and may be anything up to 160-tenths. Mr. C. Stafford Ellery, in the course of his address at a recent meeting of the Southern Association, drew attention to the fact that the ordinary dry meter will pass quantities very much in excess of the nominal capacity, "without inconvenience to the customers, but in the majority of cases with considerable loss to the suppliers." He quoted some experiments made with meters ranging from 3-light up to 50-light in size, which went to show that with 25-tenths on the inlet, and open outlet, the smallest sizes would pass about 10 times and the larger 4 or 5 times their nominal rating, and that under these circumstances the registration varied from 3½ per cent. fast to 20 per cent. slow. The test was perhaps an extreme one, since no one allows gas to blow away freely in practice. But it is quite possible that in many cases the difference between inlet and outlet pressure at the meter is as much as 25-tenths. There may be a high inlet pressure, and a full draught on the outlet caused by the use of a gas engine, or of large atmospheric burners. Mr. Ellery also experimented as to the indication of the meter when supplying a small number of by-passes or flash lights for incandescent burners. The meters used ranged from 3 up to 30-light, and they were tested with varying numbers of by-passes ranging from 1 up to 6. In all cases there was a serious loss on one by-pass, but it did not appear to be affected by the size of the meter. A 3-light showed a loss of 30 per cent., and a 30-light only 16. As the number of by-passes was increased the percentage of error fell; most of the meters gave fairly reliable results with 3 or over, and with 6 all the tests were fairly correct. Incidentally it was mentioned that the average by-pass uses a little over 4 cubic feet per 24 hours, so it cannot be said that the by-pass is so extravagant as some are anxious to make out. It is evident that at current prices for gas the cost of a by-pass is less than a penny a week—and if only one is used a great deal less. Evidently the meters should be tested at something like an average distributing pressure, say 3 inches, and under more stringent tests for minimum and for maximum registration.

Another important question is that of temperature. The official results are corrected to the so-called standard of 60° F., but the average ground temperature throughout the British Isles is under 50°. Experiments on the actual temperature at the consumers' meter give an average of 48° for the year. Allowing for the fact that two-thirds of the consumption is taken during the winter months, we might call it 45°. Gases expand or contract 1 per cent. for every 5°, and therefore the temperature regulation alone is against the seller to the extent of 3 per cent.

Taking these points into consideration, it is evident that the Sales of Gas Act is quite 5 per cent. against the seller. Perhaps this did not matter when there was no particular importance attached to the price of gas, but the case is different in these days of sliding scales, cutting prices and competition. Where the rate of dividend depends on the price at which gas is sold, a difference of 1½d. to 2d. per 1,000 cubic feet is not to be overlooked. And when reports on the cost of public lighting or the lighting of large public buildings are prepared, the selling price is taken as a basis without reference to the 5 per cent. margin. Whatever the case may be as regards the past it is evident that this 5 per cent. incubus must be removed, and the gas industry must not rest until the legal restrictions on the sale of gas are as fair towards one party as another.

Mr. J. Stratford, Gas Meter Inspector to the City of London, has presented his report for the year 1909, and as he has examined over 86,000 meters during that period, his experiences of the working of the Sales of Gas Acts afford valuable information. Of the number mentioned nearly 50,000 were slot meters, and only 765 were wet meters, and of the total number 32,728 were new, 46,111 repaired, and 7,544 were disputed—1,430 meters were found to be fast, and 1,905 were slow, and the majority of the fast meters were under 4 per cent. against the user, but nearly half the slow meters were over 10 per cent. against the seller.

In considering the general remarks appended to the report, it must be remembered that the inspector is appointed to look after the interests of the consumers. He objects to disputed meters being tested by the gas companies previously to the official test, which should be made as soon as possible, and after as little disturbance by carriage, etc. He suggests that the official seal should be dated and available for 7 years only, so that a meter would not be in use over 7 years without being tested. Most gas companies would agree to such a provision. He also deals at some length with the testing of the counting machinery as above alluded to, and arrives at the conclusion that the game would not be worth the candle.

Items of Interest
FROM VARIOUS LOCALITIES.

THE United Gas Improvement Company has filed with the Building Inspector plans showing a proposed important series of betterments on the Michigan avenue plant of the Atlantic City (N. J.) Gas Company, which will result in the Company's plant being up to a daily capacity of 4 millions cubic feet—more than double the existing capacity of the plants of the Atlantic City Gas and Water Company and of the Consumers Gas Company.

"V. W. S.," writing from St. Louis, under date of the 26th ult. forwards the following: "Last week, Mr. Hamilton, of the Board of Delegates, of St. Louis, introduced a measure under which it is proposed to supply natural gas to the city at 45 cents per 1,000, and artificial gas at a price to be agreed upon by the Company and the city. The bill requires that the Company shall deposit $25,000 in cash, which shall be forfeited if it does not begin work within 1 year from the acceptance of the franchise. If the Board of Public Improvements approves the plans of the Company it must begin work within 3 months and install 100 miles of mains within 2 years in districts outlined by the Board. The bill stipulates that 100 miles be installed each succeeding 4 years until 500 miles are in service. After that the Company must furnish gas upon demand. The bill requires the Company to pay to the city 5 cents for each 1,000 cubic feet of gas sold. A deposit of $5 is required of each consumer, and the Company has the right to discontinue service when the consumer's account is 30 days in arrears. A charge of 50 cents for turning on the gas again may be collected, according to another provision of the bill."

IT must be pleasant, indeed, to read about one's self, as per the sample below; and it is equally pleasant to have one's friends, having read the lines, aver that, from their personal knowledge, the statements therein contained are true—this is in the instance of the Richmond (Va.) Municipal Gas Works: "Superintendent W. P. Knowles, of the gas works, has made these one of the most valuable assets of the city, and under his capable management and with a force of 119 efficient employees the value of the plant to the city, the the efficiency of the service and the economy of operation are expected to grow with the passage of time."

MR. EMIL G. SCHMIDT, Vice-President of the Evansville (Ind.) Gas and Electric Light Company, acting for it, recently appeared before the Board of Public Works to urge the passage of the franchise permitting it to lay pipes for the furnishing of steam to the residents along such steam pipe line.

THE Pacific Gas and Electric Company, with its subsidiary Companies, through the annual report for 1909, shows a gain for the twelvemonth, as against the 12 months of 1908, amounting to $1,478,684.

THE Board of Gas and Electric Light Commissioners has under advisement the petition of the proprietors of the Marblehead (Mass.) Gas Company to be allowed to consolidate with the Lynn Gas and Electric Company. At the hearing Mr. Benjamin N. Johnson appeared on behalf of the Company and the Marblehead corporation was represented by Mr. Charles F. Prichard. One feature of the agreement is that the Lynn Company shall be authorized to issue 325 shares of additional stock, the proceeds to go toward taking over the Marblehead shares and to pay the liabilities of the latter. It was agreed to that the selling rate in Marblehead should be reduced to $1.25, gross—it is now $1.88—this to be reduced as the output increased. All the officials of Marblehead favor the plan, and there was virtually no opposition during the hearings on the part of any taxpayer of Lynn or of Marblehead.

THE Consumers Gas Company, of Reading, Pa., has applied to the Town Council of Birdsboro, Pa., for the right to extend its mains to and through that section. The informant who sent on this news concludes his letter in the remark: "It is strange that th Reeading folks awoke to the Birdsboro district as one worthy of piping only subsequent to the application of a charter filed not long ago by the projectors of the Birdsboro Gas Company."

HENRY S. HART, writing under date of the 27th ult., incloses this: "Gas in Pontiac will cost $1.10 per 1,000 cubic feet after the 1st prox. At a meeting of the City Council, held April 18th, the Pontiac Light Company reported that its sales of gas for the twelvemonth ended March 30, 1910, amounted to 50,472,700 cubic feet. According to the terms of its franchise, the Pontiac Light Company agreed to lower the price of gas when its sales in any single year reached 50,000,000 cubic feet. The rate will be lowered from $1.30 per 1,000, if paid before the 15th of the month, to $1.25, with 15 cents off, within equal time, to that noted above. This brings the rate to $1.10 net. The franchise further provides that when the sendout reaches 75,000,000 cubic feet the rate shall be $1.05 net, and when the output reaches 100,000,000 cubic feet the rate shall be $1."

AT the annual meeting of the shareholders of the Jackson (Tenn.) Gas Company the annual reports showed a very satisfactory increase in the volume of business transacted, and Manager Henry Kinkaid was "highly commended" for the excellent results attained. The following officers were elected: Directors, John L. Wiedner, H. E. Kinkaid, A. W. Howard, E. V. Mix and R. M. Simmons; President, John L. Wiedner; Vice-President, R. L. Simmons; Secretary and General Manager, H. E. Kinkaid; Treasurer, Thomas Polk; Attorney, W. G. Timberlake.

LATE advices by way of Baltimore are to the effect that the Charleston (S. C.) Consolidated Railway, Gas and Electric Company, which was "financed" by Baltimore men, with Francis K. Carey as the nominal head, is to be "refinanced," for which purpose a new concern, known as the Charleston Consolidated Railway and Lighting Company, has been incorporated in South Carolina The beginning capital is $2,000,000, of which $500,000 is of the preferred order, the balance to be designated as common stock. The ultimate capital is $4,500,000, of which 1/3 is to be preferred and the balance common. The dividend on all the preferred stock is limited to 6 per cent.

THE Milton (Pa.) Gas Company will expend at least $30,000 on betterments this season, a considerable portion of which will go towards main extensions. Superintendent Butterworth has also arranged with the Improved Equipment Company for an installation of 3 benches of half-depth, non-clinkering type. Mr. Butterworth, while kept pretty well on "the go," is nevertheless satisfied to keep up the pace, provided he can succeed in obtaining results, even a trifle under those which have so far followed his intelligent direction of the Milton plant.

MR. THOMAS J. MULVIHILL, for 10 years or more a valued employee of the New Orleans (La.) Gas Company, died at his home in that city the evening of April 16th. He was in his 30th year.

THE State Department of Pennsylvania has issued a charter to the projectors of the Suburban Gas and Fuel Company, of Dallastown, Pa., the incorporating of which concern was hitherto noted in the JOURNAL.

"MR. FREDERICK T. BROCKINGTON, the go-ahead Manager of the corporation which has just resulted from the combination of the Laconia (N. H.) Gas and Electric Companies, and which is doing business under the title of the Laconia Gas and Electric Company, is out with a cheaper selling rate for gas. Beginning to-day the gross rate is cut to $1.20 per 1,000—a reduction of 20 cents—prompt payment (within 10 days) calling into play a discount, ranging between 10 cents and 25 cents per 1,000 cubic feet, depending on the monthly quantities consumed. The Company is at present engaged in making repairs to its electric plant, Lakeport section, which was badly crippled in March through the breaking down of both Diesel engines. The new electric station at East Tilton is a beauty.—T. W. V."

MR. L. L. FREEMAN, writing from Ellensburg, Wash., the 19th April, says that that evening the City Council granted to A. E. Wright and associates, of Olympia, Wash., a franchise to manufacture and sell gas for illuminating, heating and power purposes in Ellensburg. It is specified that at no time shall the maximum rate be in excess of $3 per 1,000 cubic feet. Other conditions are: For the first 5 years, the Company may not pay any royalty to the city; for the second 5 years, it shall pay 1/4 of 1 per cent.; for the next 10 years the payment to be 1 per cent.; for the last 30 years the payment to be 2 per cent. on its gross receipts into the city treasury.

THE arrangement for the conveying of artificial gas from the works of the Fort Wayne (Ind.) Company to Bluffton, Ind., are about completed. Gas will surely be turned on by the 1st prox., and that is "going some."

ADVICES from Haverhill, Mass., dated the 26th ult., are to the effect that some days prior thereto, Manager Royce, of the Stone & Webster Company, and Judge John J. Winn, attorney for the Haverhill Gas Light Company, appeared in the City Hall with a proposition for the consideration of the members of the Municipal Council, and which is now under advisement by the Council. Substantially, the Company agrees to sell gas for 90 cents per 1,000 cubic feet, until July 1, 1911, and agrees, if so allowed, to further reduce the price to 85 cents per 1,000 after that date. The Company asks the privilege of retaining the pipes, etc., of the old Company, and agrees to put the surface of the streets dug up by it in such shape that same will be satisfactory to the municipal authorities. It agrees to give up-to-date service in every particular, and also agrees not to hold the city responsible in point of damages or liability. The books of the Company are to be kept open to the members of the Council at all times. Other pledges were made but these were to be kept under cover until consideration had been given them by the Council Committee.

AT the annual meeting of the Vineland (N. J.) Gas Company the following officers were elected: Directors, J. C. Morrow, George Cunningham, Jos. H. Dowler, Jr., E. M. Kimball, B. F. Ladd, W. MacGeorge, L. Newcomb, F. H. Walls, R. E. Williams, S. R. Kirkpatrick, B. L. Van Schaick, Jos. R. McClure, Jr., and John Graham; President, James C. Morrow; Secretary, Jas. R. McClure, Jr.; Treasurer, B. L. Van Schaick.

MR. C. J. BENDT, Secretary of the Charleston (S. C.) Gas Light Company, has informed the shareholders that a special meeting will be held the 21st inst., at noon, "for the purpose of considering and acting upon a proposition to enter into a lease with the Charleston Consolidated Railway, Gas and Electric Company, in the form and of the effect recommended by the Directors at their meeting held the 21st ult."

MR. O. R. TILTON, writing from New Albany, Ind., under date of the 22d ult., incloses this mention: "A meeting of the employees of the United Gas and Electric Company, New Albany Water Works, Louisville and Southern Indiana Traction Company, and the Louisville and Northern Railway and Lighting Company, was held last week in Music Hall, probably 175 people being present. Monthly meetings of the employees of the various utilities are held regularly, but this was the first combined meeting, and it surely will not be the last. Music was furnished by an orchestra, comprising the members and their friends. A vocal solo was rendered by Mr. Rudolph Rockenbach, accompanied by Mr. Anton H. Embs, supervisor of music in the public schools, and a quartet, composed of Messrs. Shrader, Merker, Lloyd and Reilly, sang a selection. An interesting demonstration of 'First Aid to Persons Overcome by Gas or Shocked by Electricity' was made by Dr. J. F. Weathers, and an entertaining address was made by Mr. Evan B. Stotsenburg on 'Obligations of Public Service Corporations to the Public as Viewed by One of Them.' Mr. Stotsenburg's remarks were listened to with marked attention by the employees. The programme closed with a buffet luncheon and smoker. Mr. R. W. Waite, Secretary of the Public Utilities Companies, acted as Chairman for the evening."

THE New England Gas and Coke Company is planning to build a smelter on the east side of Island End river, close to its present coking plant. It is proposed to smelt Cuban iron ore; and it is estimated that the project will involve an expenditure of $1,500,000.

THE Massachusetts Board of Gas and Electric Light Commissioners has approved an issue of 200 additional shares of stock, and $20,000 of 5 per cent. bonds by the Amesbury Electric Light Company. It is also ordered that the Company's dividends shall not exceed 5 per cent., until an existing indebtedness of $5,000 is paid.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHARLES H. WADELTON,
MANAGER.

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MONDAY, MAY 2, 1910.

The Market for Gas Securities.

A week ago we had to report a net loss in Consolidated over the prior week of 3¼ points, and this week we have to chronicle a loss of 7 points from the figure of a week ago, which is going down with a rush. It certainly is an anomalous condition, for to a certainty the Company's position, in every respect and sense, is better now than ever before. Good business, low prices for materials—excepting anthracite coal—and harmonious relations with the State and the city are the absolute features of its current trading; but the shares are quoted on the Exchange, so the quotations for Consolidated must go down along with the cats and dogs. At noon to-day (Friday) the figures were 134¼ to 135. No change was made in the dividend rate on Consolidated, on which a regular quarterly of 1 per cent. was declared yesterday.

As a rule, out-of-town gas shares are at steady prices, save in the instance of Peoples, of Chicago, and Laclede, of St. Louis, which shares are also in the windy register of Wall street.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

MAY 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	134¼	135
Central Union Gas Co.— 1st 5's, due 1972, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River— 1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	140	150
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106½	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	.65	.70
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000		—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	99¾	100
Preferred	2,500,000	100	90	95
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,370,000	50	143	145
Madison Gas and Electric Co. " 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	78½	79
Preferred	25,000,000	100	91½	91¾
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	103	103½
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.— 1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	200	352½	—
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

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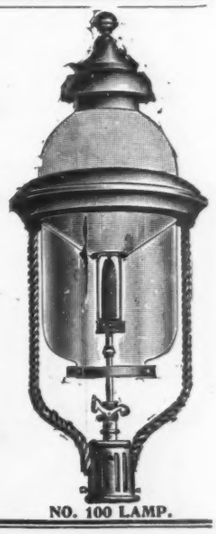

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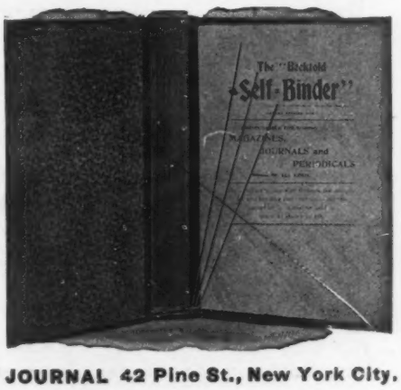

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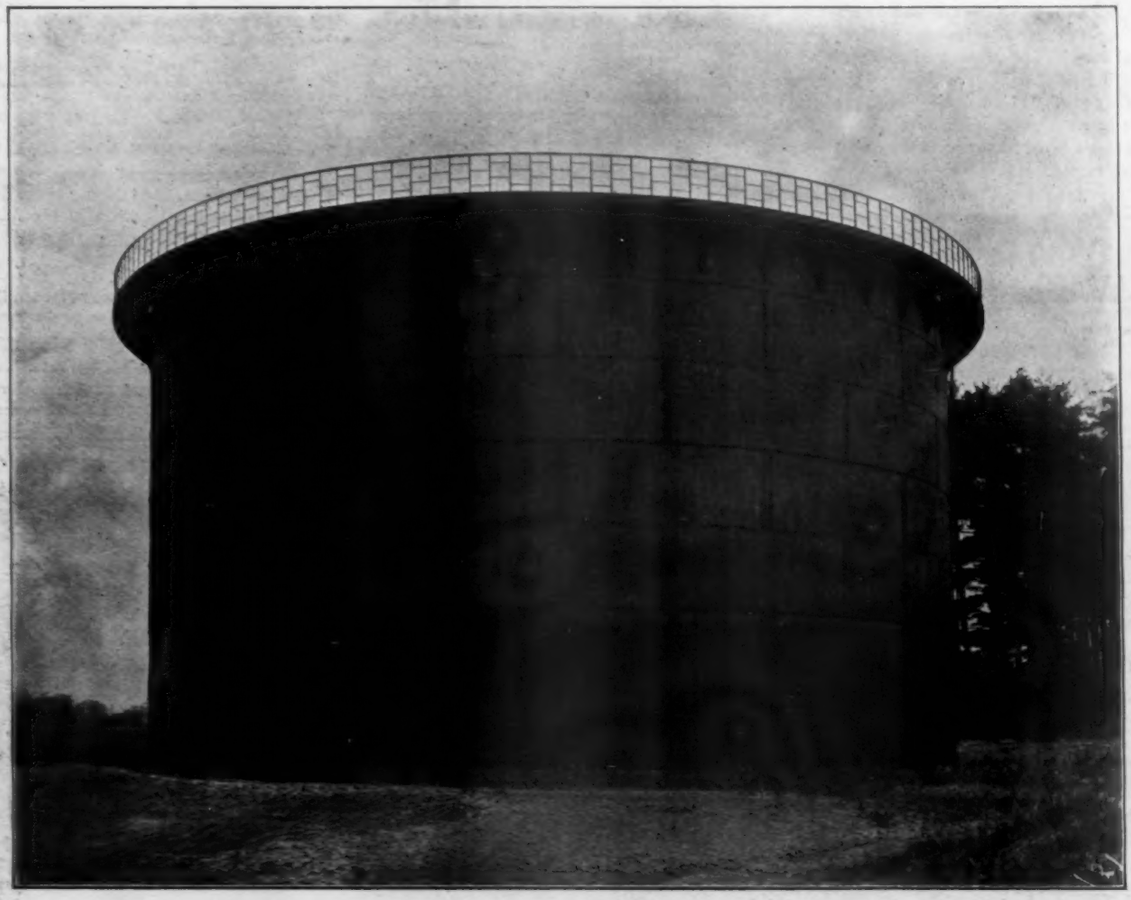

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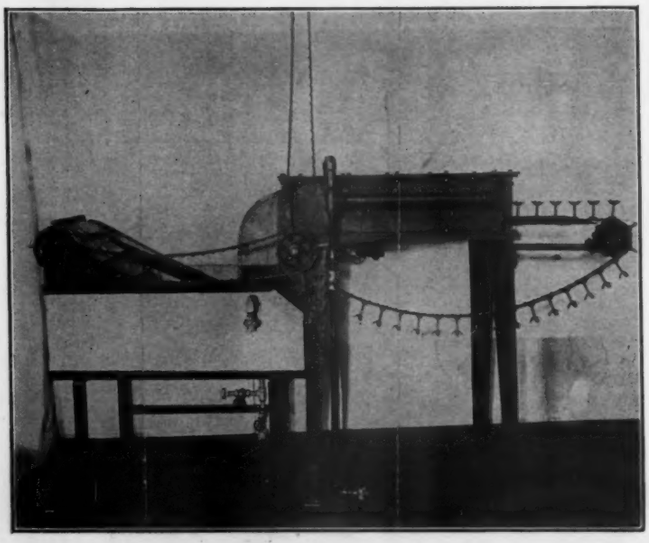

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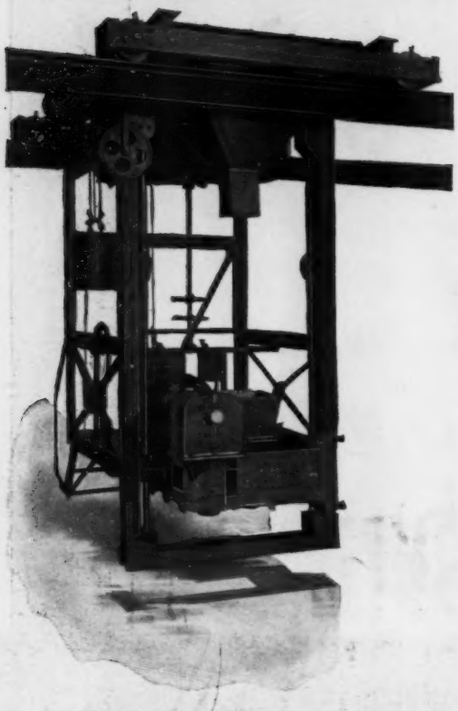

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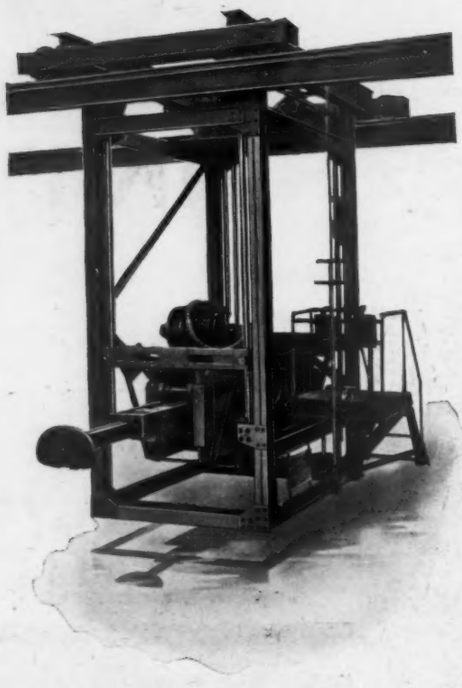

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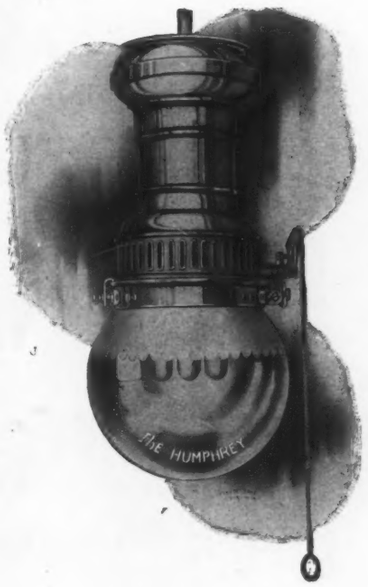

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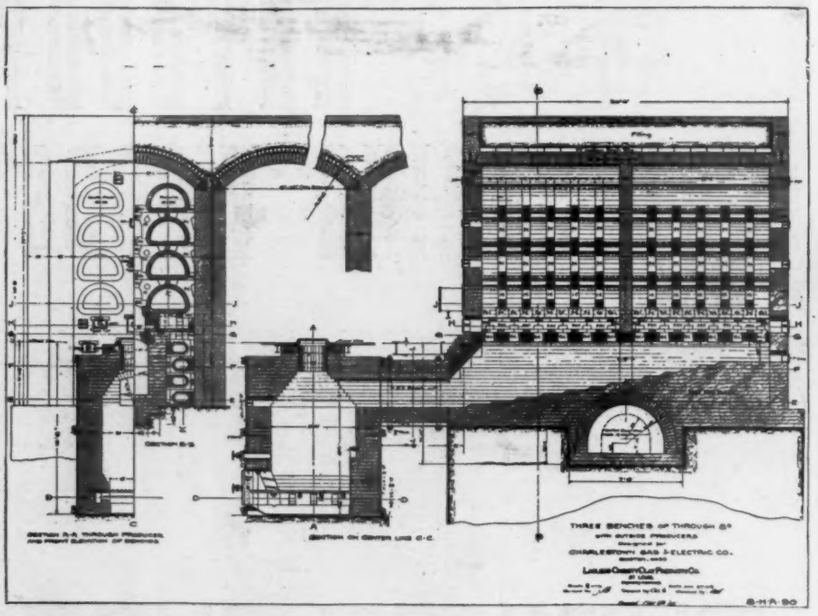

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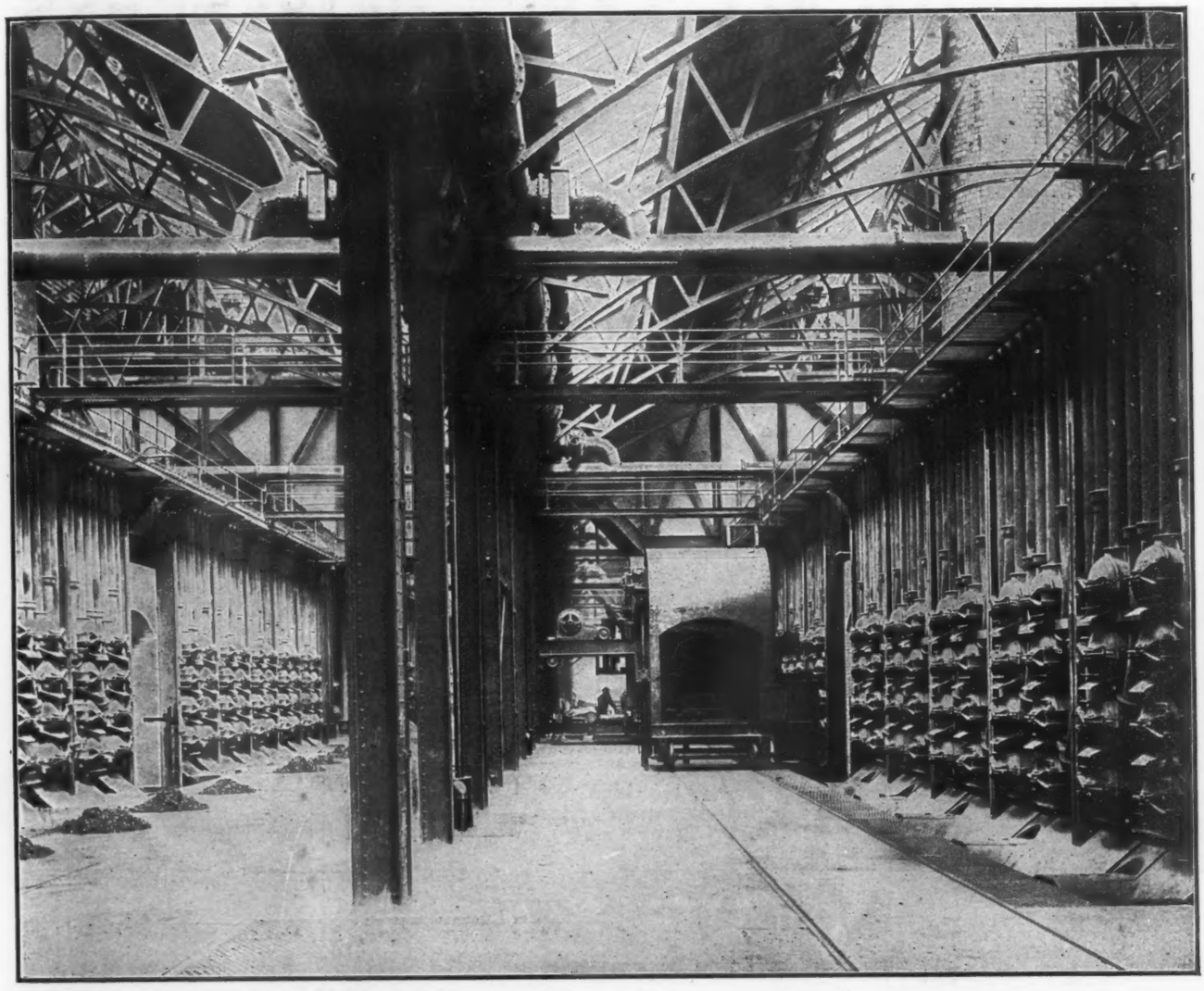

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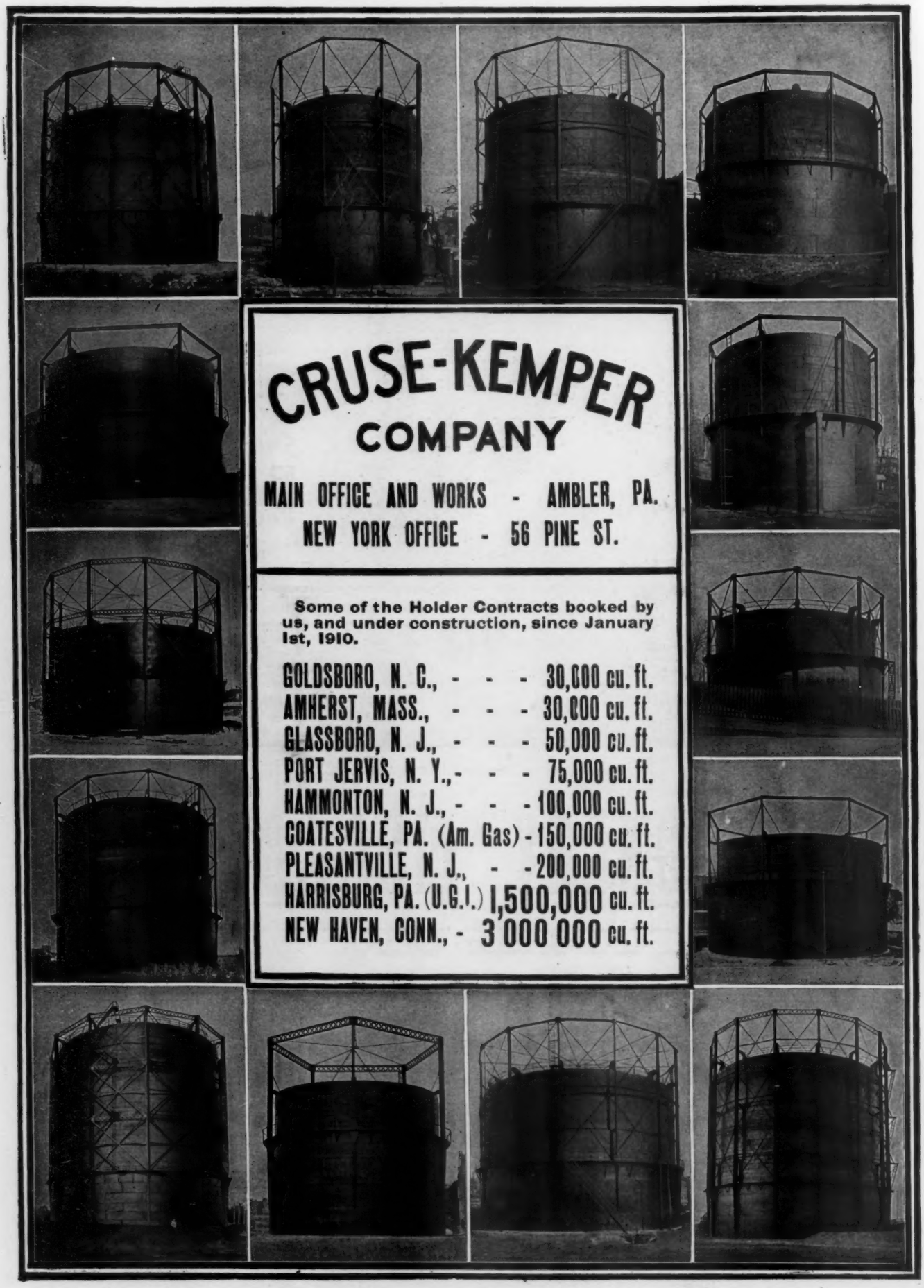
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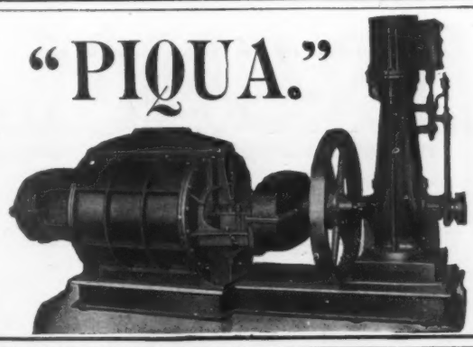

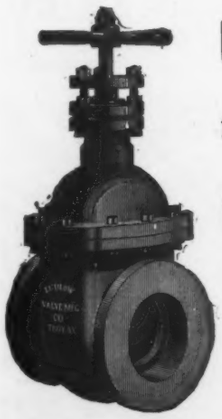

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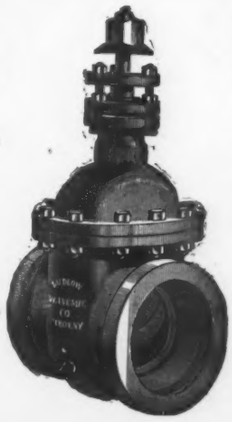

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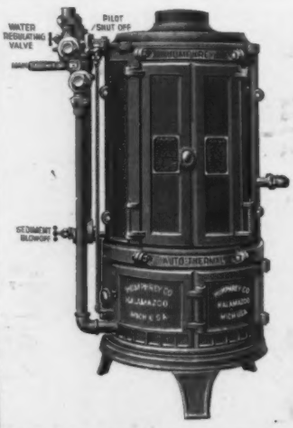

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						From Time Given.	
		P.M.				P.M.	A.M.
Sun.	1	7.30	2.30 A.M.	Sun.	1	6.47	3.52
Mon.	2	7.30 L.Q.	3.10	Mon.	2	6.47	3.52
Tue.	3	7.30	3.40	Tue.	3	6.47	3.52
Wed.	4	7.30	4.00	Wed.	4	6.47	3.52
Thu.	5	7.30	4.00	Thu.	5	6.47	3.52
Fri.	6	7.30	4.00	Fri.	6	6.47	3.52
Sat.	7	7.30	4.00	Sat.	7	6.57	3.42
Sun.	8	7.30 N.M.	3.50	Sun.	8	6.57	3.42
Mon.	9	7.30	3.50	Mon.	9	6.57	3.42
Tue.	10	7.30	3.50	Tue.	10	6.57	3.42
Wed.	11	7.30	3.50	Wed.	11	6.57	3.37
Thu.	12	7.30	3.50	Thu.	12	6.57	3.37
Fri.	13	11.20	3.50	Fri.	13	6.57	3.37
Sat.	14	12.00	3.50	Sat.	14	7.07	3.27
		A.M.					
Sun.	15	12.30 F.Q.	3.40	Sun.	15	7.07	3.27
Mon.	16	1.00	3.40	Mon.	16	7.07	3.27
Tue.	17	1.20	3.40	Tue.	17	7.07	3.27
Wed.	18	1.40	3.40	Wed.	18	7.07	3.27
Thu.	19	2.10	3.40	Thu.	19	7.07	3.27
Fri.	20	2.30	3.40	Fri.	20	7.07	3.27
Sat.	21	2.50	3.40	Sat.	21	7.12	3.22
Sun.	22	No L.	No L.	Sun.	22	7.12	3.22
Mon.	23	No L. F.M.	No L.	Mon.	23	7.12	3.22
Tue.	24	No L.	No L.	Tue.	24	7.12	3 22
Wed.	25	7.50 P.M.	10.00 P.M.	Wed.	25	7.12	3.22
Thu.	26	7.50	11.00	Thu.	26	7.12	3.22
Fri.	27	7.50	11.50	Fri.	27	7.12	3.22
Sat.	28	7.50	12.30 A.M.	Sat.	28	7.12	3.17
Sun.	29	7.50	1.10	Sun.	29	7.12	3.17
Mon.	30	7.50	1.40	Mon.	30	7.12	3.17
Tue.	31	7.50 L.Q.	2.10	Tue.	31	7.12	3.17

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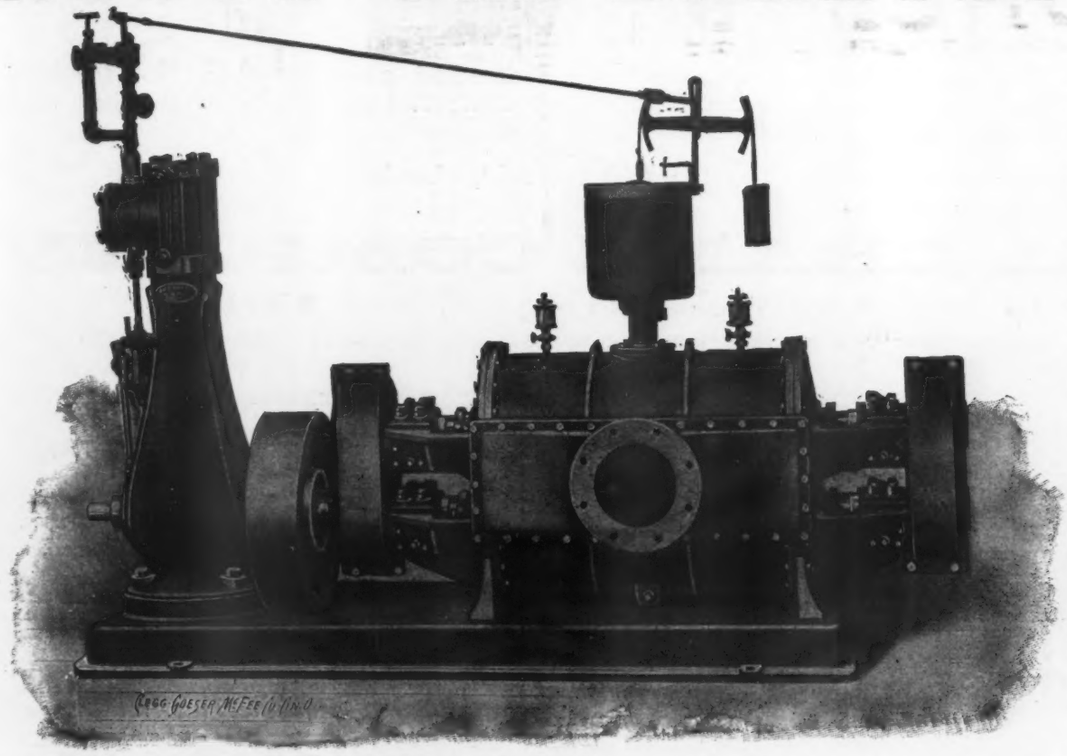

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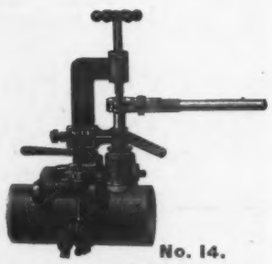

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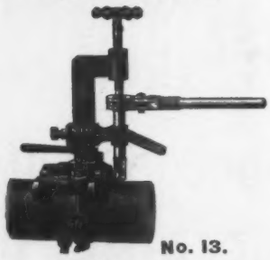

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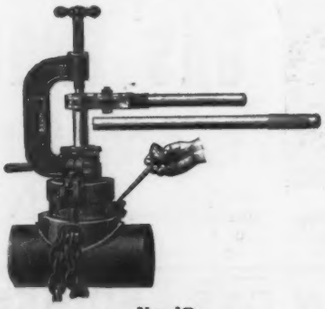
No. 17.



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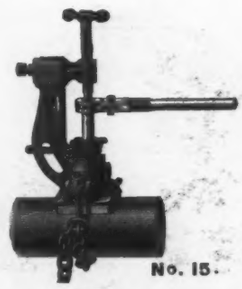
NO 16.



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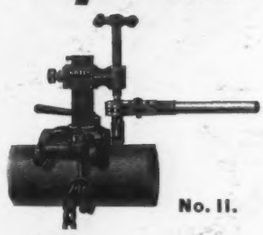

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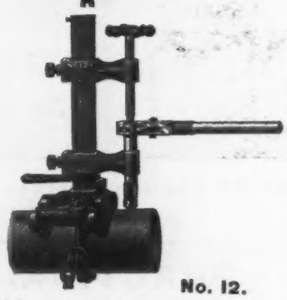

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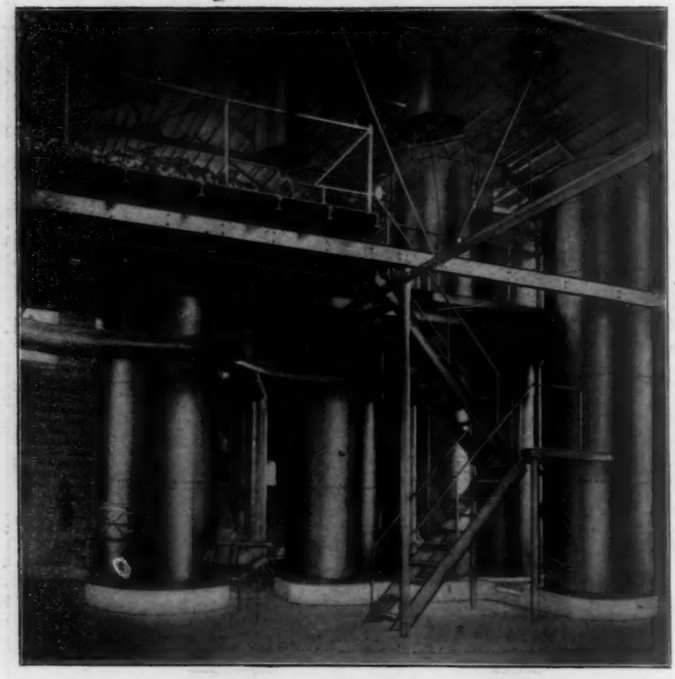

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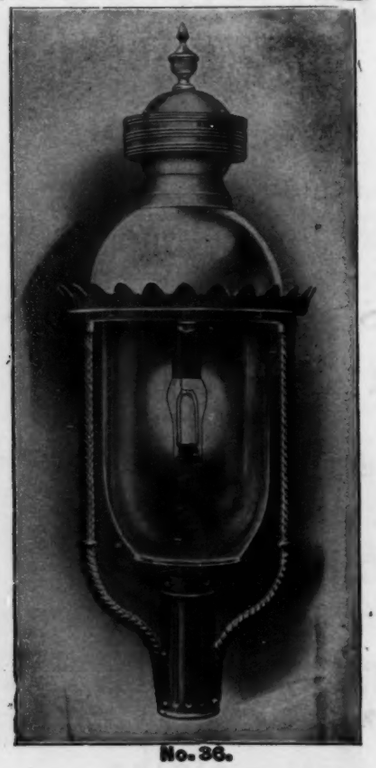
OF AMERICA



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Uniformly SUCCESSFUL in 150 Cities and Towns.

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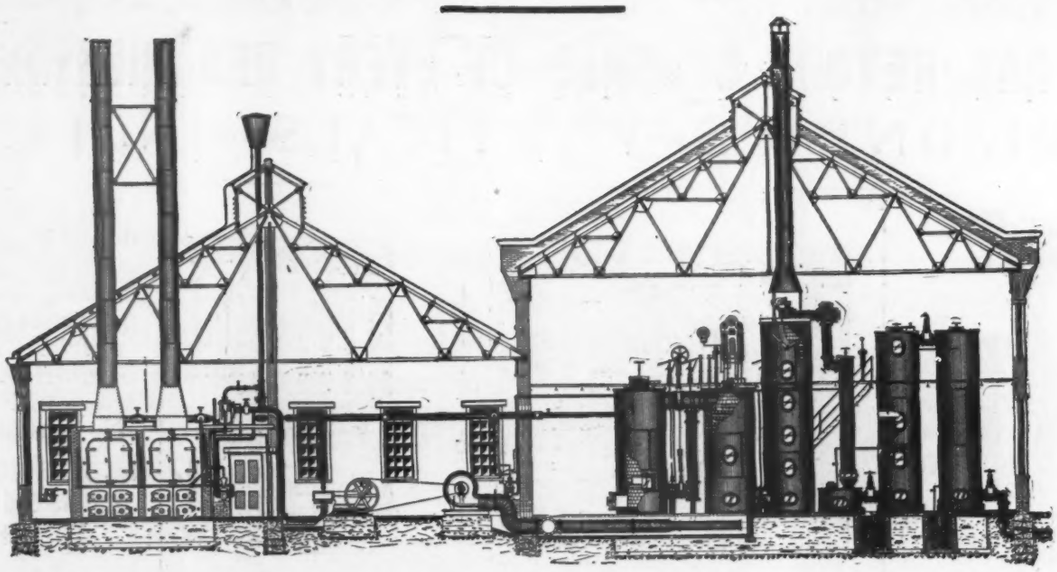

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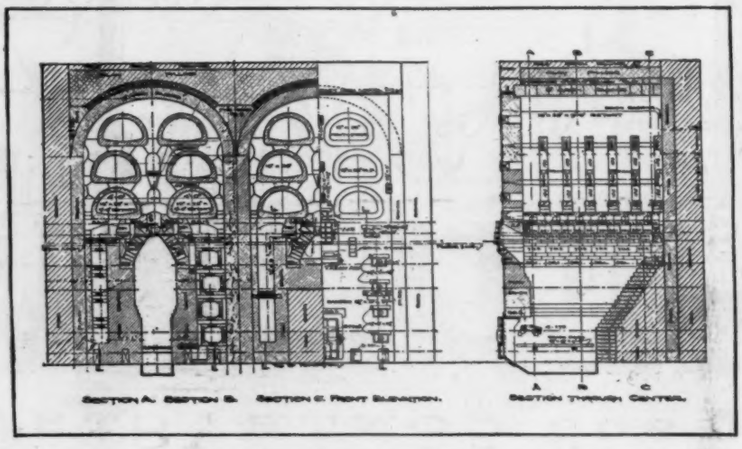

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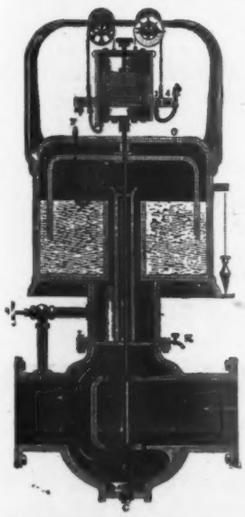

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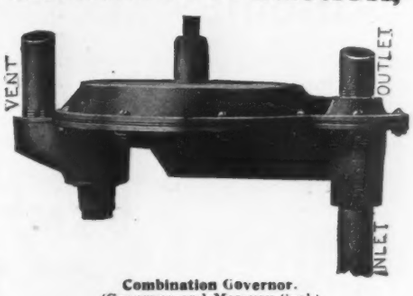

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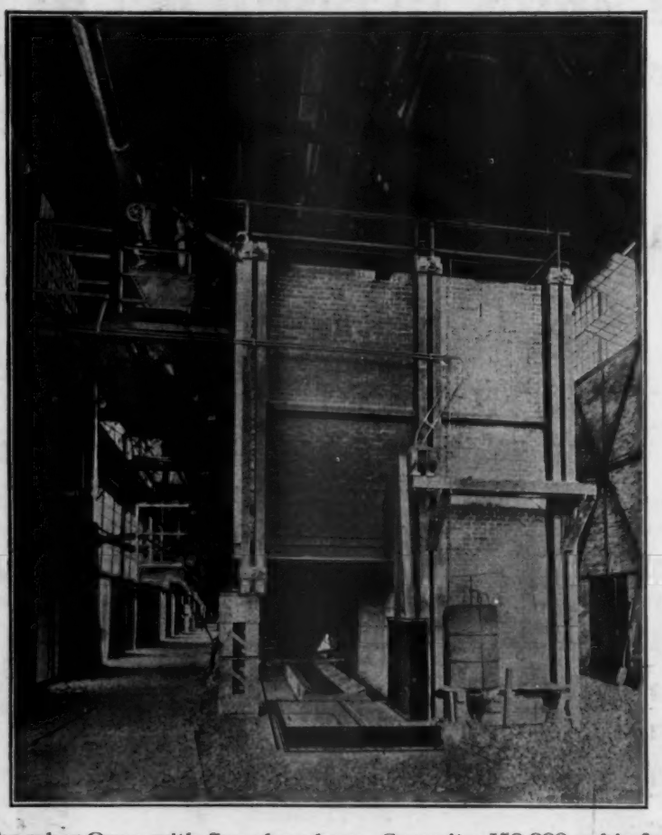

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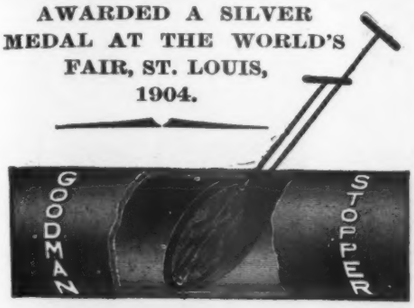

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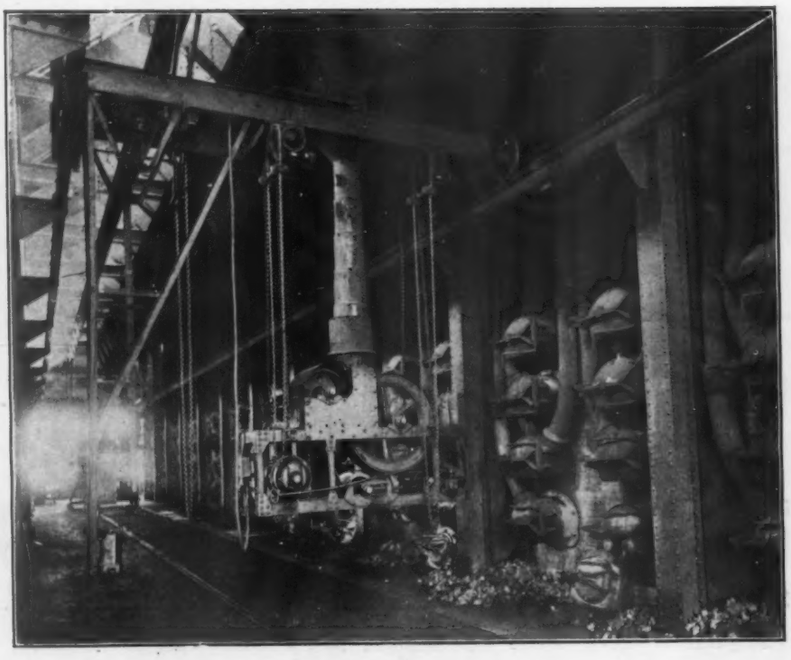

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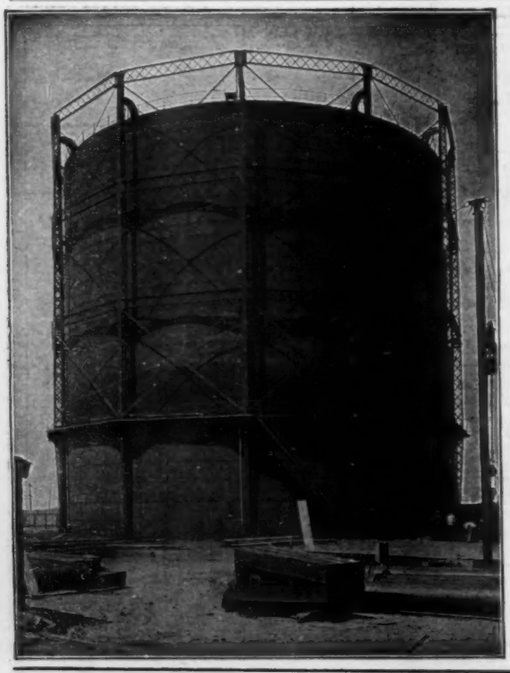

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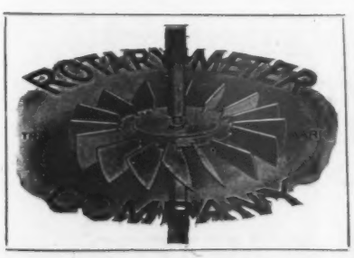

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